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ABSTRACT

This document is a workbook for apprentices learning the meatcutting trade in California. The workbook is divided into eight units covering the following areas: the apprentice meatcutter: applied arithmetic: tools and equipment: weighing, packaging, and labeling: meat and fish as foods: meat from farm to table: inspection, classification, and grading: and meat sales promotion. Each unit contains three to nine lessons: and each lesson provides an introductory question section covering the material to be learned in the lesson, topics for discussion, and a study guide. Some lessons have suggested study assignments. A glossary and a list of instructional materials complete the workbook. (KC)

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MEATCUTTING WORKBOOK PART 1

U.S. DEPARTMENT OF HEALTH,
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MEATCUTTING WORKBOOK PART 1

Prepared under the direction of the
CALIFORNIA STATE EDUCATIONAL ADVISORY
COMMITTEE FOR THE MEATCUTTING TRADE
and the
VOCATIONAL EDUCATION SUPPORT SERVICES
SECTION, CALIFORNIA STATE DEPARTMENT
OF EDUCATION

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Foreword

In the California apprenticeship training programs, experience gained on the job is supplemented by classroom work that is closely related to the job. These job-related apprenticeship training courses are highly specialized in nature. Because of that specialization, adequate training materials are either scarce or are not available at all commercially. For this reason, the training materials for the meatcutting trade and other trades are developed by the State Department of Education in close cooperation with labor and management. The materials are then made available to you at cost. These materials are to be used throughout the four-year training program while you are in the process of becoming a skilled and productive journey-level worker.

This workbook, *Meatcutting,* Part 1, was written to provide you with current information needed to meet the technical demands of your industry. Every effort has been made to provide you with a workbook that is clear, comprehensive, and current. I hope you will find participation in the related training course both helpful and stimulating, and I wish you every success in your new venture.

Wilson Riles

Superintendent of Public Instruction

Preface

The Vocational Education Support Services Section in the State Department of Education provides for the development of instructional materials for apprentices under provisions of the California Apprentice Labor Standards Act. These materials are developed through the cooperative efforts of the Department of Education and employer-employee groups representing apprenticeable trades.

This publication, *Meatcutting*, Part 1, is designed for the use of apprentice meatcutters in California. This edition was planned and approved by the California State Educational Advisory Committee for the Meatcutting Trade, under the chairmanship of D. "Whitey" Ulrich, southern California. The other members of this committee are Walter Bachemin and George Bailly, northern California; and William "Bill" Mona and Vincent Salazar, southern California. The material for this publication was written by Warren J. Auld, former instructor in apprenticeship courses at Pasadena City College and for the North Orange County Community College District.

Beverly Campbell, Consultant, Apprenticeship Education and Industrial Education, coordinated the project activities for the Vocational Education Support Services Section. Blair Hansen, former Managing Editor, and Theodore R. Smith, Editor in Chief, coordinated publications activities for the Bureau of Publications.

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UNIT A THE APPRENTICE MEATCUTTER

TOPIC 1—THE BACKGROUND AND PURPOSE OF APPRENTICESHIP

This topic, "The Background and Purpose of Apprenticeship," is planned to provide answers to the following questions:

- **What is the meaning of apprenticeship?**
- **What is the history of apprenticeship?**
- **What was the guild system?**
- **How did the industrial revolution affect apprenticeship?**
- **What were the causes of the revival of apprenticeship?**
- **What is the structure of today's apprenticeship system?**

Meaning of Apprenticeship

The root meaning of the word *apprentice* is *one who learns.* An apprenticeship is the process whereby a worker learns a skill by practicing under the guidance of a trade journey-level worker. The apprentice receives the additional instruction needed to become a proficient tradesperson by attending classes. Apprenticeship has been in use for centuries. Various other systems have been tried without success. Long ago an apprentice's pay consisted primarily of the instruction he or she received during a seven-year apprenticeship. Today, however, apprenticeships are much shorter, and the apprentice receives both instruction and pay.

History of Apprenticeship

A written code regulating apprenticeship existed as early as 2100 B.C. Apprentice training formed the primary means of trade education until the machine age. Originally, this type of training was used in some of the professions as well as in the trades. However, apprenticeship has declined in the professions and in other occupations in which general knowledge and scientific principles form a much larger part of the content to be learned than they do in the manipulative skills. In the development of a skilled tradesperson, training on the job is still considered essential, and apprenticeship has proved to be the most practical means of regulating such training.

Guild System

Very early records of the operation of the apprenticeship system are vague; however, we know that this system began to flourish with the growth of the guilds. A guild was a trade association whose membership was made up of masters, journey-level workers, and apprentices who worked in a particular trade. The right to work in a trade depended on membership in the guild, and membership often carried with it the privileges of citizenship.

Indenture agreement. Apprenticeship based on a written agreement called an indenture was created and controlled by the guilds. The relationship between master and apprentice was much like that between father and son, and the master's authority extended to every phase of the apprentice's life.

For the first four years, the master was responsible for providing the apprentice with food, clothing, housing, and tools; for teaching the young man a trade; and for instructing him in ethics, morals, and religion. In the fifth year the apprentice received his first pay and provided his own support. In the sixth year his pay was increased so that he could support himself and furnish his own tools. At the end of his apprenticeship training, the boy was given an examination. If he passed, he became a journeyman, or day worker, which was the original meaning of the term. When he was able to pay the necessary fees and to set up his own establishment, he himself became a master. Because this whole process was closely supervised by the guild, apprenticeship became a thorough and effective means of training.

Decline of the guilds. Under the factory system, which changed production methods, the guilds were doomed to decline. The guild system did, however, provide the chief means of trade education until about the middle of the eighteenth century.

Apprenticeship in Colonial America

During the early history of the United States, the supply of skilled workers came largely from Europe. No organized method of learning a trade existed. As the country expanded and society grew more complex, craft workers became more interested in organizing their occupations and setting up apprenticeship systems. Colonial apprenticeship resembled that of the Middle Ages, although it was not as closely supervised.

Effects of the Industrial Revolution

The factory system, which brought about swift and profound changes in economic and social life, has been termed an "industrial revolution." The articles that had been produced in small shops that employed one to four skilled workers were now being made in factories that employed many semiskilled or unskilled workers. In the period following the changeover from handicraft to factory production, many people were employed as factory apprentices. The term *apprentice* became associated in the public mind with low wages and near slavery. The apprentices were paid little and taught less; when the period of apprenticeship was over, they were set adrift with little chance to compete for jobs with a new crop of young apprentices.

As competition between factories grew, factory operators and local governing bodies found that apprenticeship solved the problem of what to do with the poor and delinquent. Orphans, the children of the poor, and prisoners were set to work for practically no pay. These unfortunates were called apprentices. Apprenticeship dropped to its lowest point in history during this period. The first labor unions opposed the apprenticeship system; but as abuses were corrected, the unions became its strong supporters.

As the factory system developed, abuses in the apprenticeship system became prevalent. The protection for the apprentice previously provided by the guilds was gone, and the system developed into a form of industrial slavery for the young. Frequently, an apprentice was required to perform tasks that had no bearing on the training, and the period of apprenticeship was often much longer than necessary.

By 1860 the industrial revolution had blotted out completely the old type of apprenticeship. America entered the period of industrial expansion of the 1870s and 1880s with no established program of effective industrial education. Apprenticeship declined for many reasons. With the development of machinery, fewer skilled workers were needed. Many employers considered training apprentices unprofitable because the trained apprentice often found work with other employers who had not bothered to train their own apprentices. Often, workers themselves did not approve of the apprenticeship system and tried to prevent an apprentice from learning all about the trade. Apprentices were frequently poorly paid while they were learning a trade, whereas jobs requiring unskilled labor paid much better. Many young people were hesitant to enter manual trades because such work meant soiled hands and rough clothes.

With the decline of the old type of apprenticeship, many substitutes were tried. For varying reasons, all failed. Occupational training schools, mostly private institutions, did not fill the need. Sometimes they failed because of the opposition of organized labor groups whose members felt that such training schools would overcrowd the trade. In other cases these schools failed because the number of individuals taking the training was insufficient to meet the demands for skilled workers.

All of these training schools were subject to a serious handicap. Because training was limited to the classroom, the schools could not prepare workers adequately. On-the-job conditions such as pay, production speed, commercial standards of work quality, and the possibility of discharge created mental attitudes toward learning that could not be produced by the school environment.

Modern Apprenticeship

By the early part of the twentieth century, it was evident that an effectively organized system of training was needed in the skilled trades. Because efforts by some of the more active trade groups in the country did not provide a broad enough solution to the problem, federal action seemed advisable.

Fitzgerald Act

The Federal Committee on Apprenticeship and the Apprentice Training Service were established in 1934. The Fitzgerald Act, passed in 1937, made the Apprentice Training Service, now known as the Bureau of Apprenticeship and Training, a permanent agency of the U.S. Department of Labor. Since that time the combined efforts of government, labor unions, and industry have greatly increased the number of apprentices in training. Vastly improved working conditions and wages have been established, and the prestige and importance of apprenticeship have been restored.

Shelley-Maloney Act

Although the establishment of national agencies contributed greatly to the rebirth of apprenticeship, the details of apprentice training programs have been determined on local and state levels. Organized apprentice training in California originated with the passage of the Shelley-Maloney Apprentice Labor Standards Act in 1939.

Under the Act an apprenticeship council, now known as the California Apprenticeship Council, was established. The Governor appoints to the council six representatives each from industry and labor and two representatives from the general public. The Council also includes the State Director of Industrial Relations, a representative of the State Department of Education, and a representative of the Community Colleges. The California Apprenticeship Council promotes and develops apprenticeship throughout the state. Among its duties is the establishment of standards for minimum wages, maximum hours, and working conditions to be included in apprenticeship agreements.

An apprentice is defined by the Shelley-Maloney Act as a person at least sixteen years old who has entered into a written apprenticeship agreement with an employer. This agreement must provide for not less than 2,000 hours of reasonably continuous employment and for participation in an approved program of training in related and supplemental subjects of not less than 144 hours per year.

The Shelley-Maloney Act named the Director of Industrial Relations as the administrator of apprenticeship and established the Division of Apprenticeship Standards. The Division does the detail work necessary for seeing that all apprenticeship agreements conform to the standards set by the law and by the policies of the council.

Apprenticeship arrangements are handled by committees representing the local employee and employer organizations. In each of the trades, representatives of the local unions and employers' organizations cooperate to form local joint apprenticeship committees (JAC). These joint apprenticeship committees exercise authority granted to them by the organizations they represent and by the apprentice when the indenture agreement is signed. These written agreements between employee and employer groups are usually called "apprenticeship standards." Those standards commonly involve (1) the selection, rating, registration, promotion, and discipline of apprentices; (2) the enforcement of individual apprenticeship agreements; (3) the determination of wage ratios for apprentices; and (4) the supervision of job training.

Joint apprenticeship committees may also be asked by local boards of education to advise school personnel concerning details of class organization and qualification and selection of teachers of apprentices. Committee members also work to encourage the interest and support of the public for the apprentice training program.

Length of Apprenticeship

California has a two-year meatcutting apprenticeship. In California an apprentice may be advanced to journey-level worker status after one year if the employer requests it in writing and if the schoolwork is accelerated so as to have both years completed at the time of advancement. The final decision must be made by the JAC.

Each apprenticeship committee or JAC will vary in some way but must stay within the framework of the apprenticeship standards.

State Apprenticeship Committee

The State Apprenticeship Committee is made up of representatives of both management and labor throughout the state. The committee's function is to coordinate apprenticeship programs throughout California.

Employee Retirement Income Security Act

The Employee Retirement Income Security Act was approved by Congress in 1974 to correct some of the abuses that had existed in pension plans.

The act provides that all private pensions be secured by a 50-cent-a-month payment to the federal government per member. All members thus are assured of their pensions at retirement time.

Topics for Discussion

Be prepared to discuss the following topics if you are asked to do so:

1. Is apprenticeship today the same as it was in the Middle Ages? If not, what differences are seen today?
2. What effect did the factory system have on apprenticeship?
3. What is the main purpose of apprenticeship? Does it fill this purpose?
4. How does modern apprenticeship benefit the apprentice, the employer, the union, and society as a whole?
5. Discuss with someone who served an apprenticeship 40 or 50 years ago the difference between apprenticeship then and now. Report your findings to the class.
6. Suggest one way in which modern apprenticeship can be improved.

UNIT A—THE APPRENTICE MEATCUTTER

TOPIC 1—THE BACKGROUND AND PURPOSE OF APPRENTICESHIP

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Apprenticeship is a system in which a worker learns a useful trade by practicing that trade under the supervision of a trade _1_ level worker.
   1. ________

2. Apprentice training was the chief method of trade education until the coming of the _2_ age.
   2. ________

3. Membership in the trade association known as the guild was made up of _3_, _4_-level workers, and _5_ who worked in a particular trade.
   3. ________
   4. ________
   5. ________

4. The basic written agreement by which a guild apprentice was bound to the master was known as an _6_.
   6. ________

5. If a guild apprentice passed an examination at the end of training, the apprentice became a _7_.
   7. ________

6. The early American colonies depended on _8_ for its supply of skilled workers.
   8. ________

7. The old type of apprenticeship was effectively destroyed by the _9_ revolution.
   9. ________

8. Occupational training schools, mostly _10_ institutions, failed to take the place of the apprenticeship system because of the opposition of organized _11_ groups, the lack of sufficient numbers of _12_, and the lack of _13_ training.
   10. ________
   11. ________
   12. ________
   13. ________

9. The law that made the Bureau of Apprenticeship and Training a permanent agency of the U.S. Department of Labor is known as the _14_ Act.
   14. ________

10. Organized apprenticeship training in California began through the enactment of the _15_-Maloney Act in 1939.
    15. ________

11. An apprenticeship agreement in California must provide for not less than _16_ hours of reasonably continuous employment.
    16. ________

12. The California training program for apprentices requires that at least _17_ hours be given each year to participation in the program.
    17. ________

13. In California the Director of _18_ Relations is the administrator of apprenticeship.
    18. ________

14. Apprenticeship arrangements are handled by _19_ apprenticeship committees.
    19. ________

15. The Employee Retirement Income Security Act was approved by _20_ in 1974.
    20. ________

UNIT A—THE APPRENTICE MEATCUTTER

TOPIC 2—LABOR AND MANAGEMENT ORGANIZATIONS

This topic, "Labor and Management Organizations," is planned to provide answers to the following questions:

- **What has been the history and purpose of the American labor movement?**
- **What union represents employees in the meat industry?**
- **What are the structure and purpose of this union?**
- **What organizations represent management and the meat industry in general?**

Employee Organizations

Local labor organizations, confined to one craft, began to appear in the United States as early as the 1780s and 1790s. Their number increased rapidly during the next 30 years. The first national convention of labor representatives was held in 1834. Like present-day unions, these groups were interested primarily in higher wages, shorter hours, and better working conditions. However, they were purely local and never succeeded in forming national organizations. At the end of the Civil War in 1865, the growth of large cities and large industries encouraged the development of much larger and more powerful labor organizations.

Early Unions

The first important national group was the National Labor Union. For a few years prior to 1872, it was the outstanding labor organization in the country. The next important group was the Knights of Labor, which grew rapidly during the late 1870s and early 1880s. It was organized on an industrial basis, with women, black workers, and employers welcomed. Its membership declined rapidly, however, partially because craft groups did not feel that the organization was sufficiently interested in the welfare of the skilled worker. Many of them withdrew to solve their own problems through labor organizations within their own crafts.

American Federation of Labor

While the Knights of Labor was declining in membership and influence, the American Federation of Labor was laying the foundation for what was later to become the outstanding labor organization in the United States. It was particularly successful because it met the needs of the skilled workers for a national organization devoted entirely to the immediate problems of their groups. The AFL, as it came to be called, originated from a group of cigar makers led by Samuel Gompers, who became the first president of the national organization. He held that office from 1886 until his death in 1924.

The AFL is a federation of a large number of independent national and international craft unions that function independently within their own fields. From time to time it has included so-called industrial unions that represent all the workers in a particular industry without regard to the specific skills employed. However, the nationally organized craft groups have been the backbone of the organization. In cases where local unions have no national or international organizations, they may obtain federal charters directly from the AFL. State federations unify and promote the interests of labor in each of the states.

Among the objectives of the AFL have been shorter workdays, higher wages, and better working conditions for its members. In addition to these specific programs, the organization has also had an interest in the promotion of state and national legislation for the general welfare of the wage earner and the general public.

Congress of Industrial Organizations

Long before the beginning of the AFL, many persons believed that labor organizations should not be organized on the basis of particular skills or crafts. They felt that the interests of all the workers in any given industry were similar and were not greatly influenced by the particular jobs the workers performed. In 1935 a group of such leaders within the AFL formed the Committee for Industrial Organization. They were subsequently expelled from the AFL. To a large extent they represented the workers in industries where the mass of semiskilled or unskilled employees felt that no place was provided for them in the old craft unions. This organization spread into many fields, adopted a constitution, and changed its name to the Congress of Industrial Organizations (CIO).

After a number of years of bitter fighting between the AFL and CIO, a willingness to cooperate began to emerge. In 1955 a formal merger took place; and a single national organization, the AFL-CIO, was created. This merger established an organization that contains the great majority of members of organized labor in the United States. Those unions not affiliated with this organization are referred to as "independent."

Food Industry's Union

The Amalgamated Meatcutters and Butcher Workmen of North America and the Retail Clerks Union agreed to merge the two international unions on June 8, 1979. The new United Food and Commercial Workers International Union is the largest union in the AFL-CIO Federation. It is an international organization that has jurisdiction over all North American countries.

Eligibility. The workers who are eligible for membership are the following:

1. Employees and other persons, including professionals, managers, supervisors, administrators, salespersons, distributors, and ancillary personnel who perform work or provide services in public or private industry in connection with or related to the sale, distribution, provision, processing, handling, or production of goods, commodities, and merchandise
2. Anyone who performs any work or services in, or in connection with, retail and wholesale stores, markets, or other facilities; slaughtering and packing; sausage making; poultry and egg production; food processing; sheep shearing; wool working; livestock handling; agriculture; fish production; fur manufacturing; dressing, dyeing, trapping, processing, or handling of fur skins or garments; or the leather and shoe industry, including manufacturing, tanning, processing, or handling of skins, hides, and other leather products
3. Any professional or technical person who performs any work or services in, or in connection with, banks or other financial and commercial institutions or health care or related facilities, including hospitals, nursing or convalescent homes, laboratories, medical or dental clinics, or pharmacies
4. Anyone who performs any work or services incidental or related to work within the jurisdiction of the International Union, including work for the International Union or its chartered bodies, or who performs work or services ruled by the International Executive Board to be within the jurisdiction of the International Union

Organization. The International Union shall have an international president, international secretary-treasurer, and 50 international vice-presidents to be listed in order of their seniority on the Executive Board. This will constitute the 52 members of the International Executive Board. Between conventions the International Executive Board is the highest authority of the International Union.

The president is the chief executive officer. The secretary-treasurer is the chief administrative officer. The vice-presidents provide assistance to the president as he or she may require.

The international president, international secretary-treasurer, and three international vice-presidents shall comprise the International Executive Committee. The vice-presidents will be elected from and by the International Executive Board. The Executive Committee shall manage the real property of the International Union in accordance with the constitution.

Purpose. The purpose of the union, as set forth in the constitution, is to elevate the position of its members; to maintain the best interest of the organization; to obtain by conciliation or by other means that are just and legal a fair remuneration to members for their labor; and to afford mutual protection to members against obnoxious rules, unlawful discharge, and other kinds of injustice or oppression. In addition, members of the union who were incapacitated through illness are entitled to certain benefits to be distributed according to the rules of the organization. In the event of the death of a member, a death claim is paid.

Union offices act as clearinghouses for both employer and employee demands under existing laws pertaining to hiring procedures. The official journal of the International Union is called *Action.* It contains information that is of interest and importance to those engaged in the represented trades. The publication *Action* replaces the *Butcher Workman.*

Employer Organizations

Several organizations represent the interests of employers in the meat industry.

National Association of Retail Meat Dealers

The National Association of Retail Meat Dealers is made up of local organizations in 79 of the principal cities in the United States. Its membership includes a majority of meat dealers in the country. In addition to a board of directors, committees on labor, trade relations, and legislation carry on the work of this organization. This organization also has representatives on the National Livestock and Meat Board and has cooperated with it to promote the education of the public to the value of meat in the diet. Additional information may be obtained from the Retail Meat Dealers Association of Southern California, 403 W. Eighth Street, Los Angeles, CA 90014.

American Meat Institute

The American Meat Institute was organized in 1906 as the American Meat Packers Association. Its purpose has been to promote the interests of the meat-packing industry, and it has cooperated with livestock producers and governmental agencies to promote the sale of meat.

California Beef Council

The California Beef Council was established in 1957 by action of the California State Legislature. The primary objectives of the council are as follows:

1. To develop, maintain, and expand state, national, and foreign markets for beef and beef products produced, processed, or manufactured in the state
2. To support this activity with promotional and educational programs designed to promote the consumption of California beef and beef products

The state has recognized that the beef industry in California, including the production, processing, manufacture, and distribution of beef and beef products, is a major contributor to the revenue of the state, employs many thousands of its residents, and furnishes essential foods that are vital to the public health and welfare. It has further recognized that the stabilization, maintenance, and expansion of this industry in California, across the country, and overseas is necessary to ensure that consumers will have an adequate supply of food and that the state will have a necessary source of tax revenue.

Information. The essential value of beef and beef products for nutrition makes it necessary that the consumer be made thoroughly aware of information relative to the healthful qualities of beef and beef products and be protected from misrepresentation and deception.

Research. The council arranges such meetings as the one that brought together 32 of the nation's heart specialists, animal scientists, and food technologists for discussion of the place of beef in diets low in saturated fats. As a result of the conference and as a beginning in the development of a low-fat beef product, the council has initiated a pioneer study to determine the relationship, if any, between the sex, marbling, and yield grade of a carcass and its intermuscular fat content. The research, carried out in cooperation with the University of California at Davis, was completed in the 1970s. The analyses and tests were conducted under the guidance of the U.C. Davis Department of Animal Science. The council will be able to use the results of the study to make recommendations to the medical profession on the use of beef in low-fat diets. The study showed that in lean beef only 50 percent of the fat was saturated and the medical profession had exaggerated the percent of saturated fat in beef.

Publicity. The California Beef Council promotes in-store posters on beef cuts and information on beef. The council also furnishes recipes on meat cookery to the consumer through retail outlets, schools, colleges, and organizations.

Organization. The council is governed by an executive committee. Financing is provided by an assessment of 25 cents per head on the beef sold.

American Sheep Producers Council

The American Sheep Producers Council, Inc., has two divisions: the American Lamb Council and the American Wool Council. The primary objective of the American Sheep Producers Council is to promote the purchase of lamb and wool products.

Publicity. Advertising is done through newspapers, radio, and television. Merchandising is done by making contact with the members of the "trade," such as packers and retailers. The markets are furnished with in-store merchandising posters. Food editors of radio, newspapers, and magazines are provided with stories about lamb cookery and photographs of lamb dishes. Educational materials on lamb cookery and preparation are provided to schools, colleges, women's clubs, and other organizations. These materials include such things as recipe folders, motion pictures, and filmstrips.

The periodical *Lamb and Wool* is promoted in heavily populated areas where the promotional dollar brings the biggest return. Developing new products is also an important part of the promotion.

Organization. The American Sheep Producers Council represents almost all the sheep producers in the United States. There are no dues. The council was organized in 1955 under Section 708 of the National Wool Act, first passed by Congress in 1954. It began its promotional work in 1956. The act authorizes the sheep industry to conduct a self-help program of promotion. The National Wool Act was extended by Congress in 1958, 1961, and 1965. In the year following each extension, the Secretary of Agriculture has called a national referendum so that sheep producers can determine for themselves whether they want to continue with the promotion of their products through the American Sheep Producers Council.

Funding. Funds for promotion come from deductions from wool incentive payments. The amounts of the deductions are 1½ cents per pound (0.5 kilogram) of shorn wool and 7½ cents for each 100 pounds (45 kilograms) of unshorn lamb. The promotion money is deducted before incentive payments are made. Funds for incentive payments to producers come from duties on imported wool.

The council is governed by a board of directors that has 45 members who are elected from the delegate body, which has 156 members representing 20 states and area councils. One delegate is allowed for each $62,500, or major fraction thereof, contributed to the promotion by a state or area council.

Sheep statistics. In the early part of the 1970s, the sheep industry was setting new records—in terms of all-time lows. The once endless bands of sheep have dwindled to a relative handful. In 1972, U.S. Department of Agriculture (USDA) statisticians recorded 18.5 million head of sheep, a drop of 28 million sheep from the first nationwide sheep census taken in 1867.

However, despite their plummeting numbers, sheep are far from fading into agricultural obscurity. Producers from North Carolina to Oregon still raise sheep, although the method of tending can vary greatly by region. The majority of this country's sheep flocks are found from the eastern seaboard through the farming areas of the Midwest. Although these farm flocks are the greatest in number, they are the smallest in size, averaging under 40 head. Sheep in farm areas are part of highly diversified agricultural enterprises, from crop raising to other livestock, and they are rarely the main order of business. However, farmers often keep sheep because these animals can thrive on stubble and by-products and can provide work for off-season labor.

In direct contrast to the farm flocks are the herds that roam the rugged western rangelands. As nomadic herds of sheep have done for centuries, these range herds follow the grass, grazing the rich mountain range in the summer and returning to the winter quarters each fall. For part of the year these nomadic sheep feed on unfenced public lands and must be tended by shepherds. The range herds, which generally number between 1,800 and 3,000 head, are often kept as specialized sheep operations. A third type of sheep raising exists in the Plains and southwestern regions of the United States where large herds usually are kept in fenced areas.

Industry research. One major problem that has always plagued the sheep industry comes in the form of the bum lamb—a lamb that has lost its mother, and so its food source, either through death, rejection, or inadequate milk. In recent decades, producers have tried to save their bum lambs by using special milk replacers developed for the cattle and hog industries; but this technique has not been successful.

In the early 1970s, however, researchers at the U.S. Sheep Experiment Station developed an acceptable lamb milk replacer. At the station, Kenneth R. Frederiksen, a research professor from the University of Idaho, explains that with this self-feeding milk replacer, lambs "get growth as good as or above the growth of a lamb on its natural mother."

From its first introduction, use of the lamb milk replacer has soared. "In 1972," according to Mr. Frederiksen, "about 70,000 lambs were reared artificially in the U.S. and use of the milk replacer is increasing." Some producers have complained that the cost of the milk replacer is too high. Mr. Frederiksen points out, however, that in 1973 lambs raised on the substitute milk brought their raisers an average profit of $10 to $15 a head. And, he says: "We are raising lambs that would ordinarily die—almost 10 percent of the U.S. lamb crop dies in the first week of life because of starvation."

New developments. Another new management system for the sheep producer is early weaning for lambs, which is often combined with a lamb confinement system. In the past, sheep raisers weaned their lambs when ready for slaughter. Today, however, many producers are weaning the lambs early and feeding them on solid rations until auction time.

Early weaning costs the producer more because the feed must be bought; however, the price advantages usually offset the extra costs. For some producers the advantage is mainly in the ability to run larger ewe flocks, which generally return greater profits. By keeping the lambs on commercial feed, sheep raisers with fixed amounts of land have more forage available for more ewes. For others, the main advantage is in better prices. By feeding their lambs, producers can avoid commercial feedlots and can bring their lambs to market early; this usually results in increased profits.

Marketing research. Although cutability grades have been ready for use for several years, they are not yet widely accepted within the total sheep industry—and opinions vary greatly on where the blame should be placed. However, shoppers may soon find heavier lamb cuts in the meat case, thanks to another new marketing tool on the scene—improved lamb wrapping bags.

"About two years ago a different barrier bag (a type of plastic packaging) was developed for lamb," says Al Farrington, meat director for Wilson and Company, which is based in Oklahoma. The bags, according to many observers, could challenge the industry's retail marketing structure. First, this barrier bag will emphasize the better, cutability-graded lamb meat. "Over recent years," says Bill Broscovak of the American Sheep Producers Council, "packers would ship the most desirable lamb carcasses in whole form. Then they would sell less desirable carcasses as primal cuts. Now the packers plan to put the better lambs as primal cuts in the new bags." This new process should encourage the producers to concentrate on the better cutability yields.

Although the new wrapping process appears to be expensive, many packers across the country are recognizing its potential. The new barrier bags extend the life of fresh lamb considerably. "Lamb meat is very perishable at the retail level," explains Mr. Farrington, "but now, with the new wrapping, we can keep lamb fresh for more than three weeks." The bags can open new, previously untapped markets for lamb meat. "Now we are shipping fresh lamb to Japan," says Mr. Farrington, "where before we couldn't ship it to Scottsbluff, Nebraska."

National Livestock and Meat Board

The National Livestock and Meat Board was organized in 1922 to do research on the value of meat in the diet and thus combat propaganda by food faddists that meat was harmful and was the cause of such ailments as gout, rheumatism, high blood pressure, and Bright's disease. In recent years such research, especially into the causes of heart trouble and cancer, has been done to prove the benefit of meat in the diet. Every branch of the industry is represented on this board: meat retailers, meat packers, livestock growers and feeders, livestock marketing agents, and restaurateurs.

The purposes of the organization are research, education, information, and promotion of the industry. More information may be obtained from the National Livestock and Meat Board, 444 Michigan Avenue, Chicago, IL 60600.

Pacific Coast Meat Jobbers Association

The Pacific Coast Meat Jobbers Association is an organization that engages in industry promotions.

Food Employers Council

The Food Employers Council is the labor relations representative for the employers. The organization handles all contract negotiations, grievances, and arbitration for the industry in California and Nevada. Industry representatives serve on the trust fund committees and appoint employers as members to serve on apprenticeship committees.

National Turkey Federation

The National Turkey Federation is a service organization representing the $1.16 billion American turkey industry. The federation was organized to promote turkey production and marketing. The federation's objectives are (1) to increase turkey consumption; (2) to promote legislation favorable to the industry; (3) to assist in collecting and distributing news material, market information, and other information helpful to the industry; (4) to promote turkey research and assist members in getting up-to-date information on turkey breeding, feeding, disease control, and marketing methods; and (5) to work for the best interests of the turkey industry.

Publicity. The federation's Consumer Information and Education Program is an important part of the campaign to promote turkey consumption.

Insurance. The National Turkey Federation makes low-cost life, health, accident, hospitalization, and turkey crop insurance available to members, their families, and employees. The federation, which was organized in 1939, is run by an elected board of directors. Additional information may be obtained from the National Turkey Federation, Suite 302, International Center, Reston, VA 22091.

NOTE: To provide more local information on this topic, the instructor may wish to invite a representative from the trade union and a representative from the employers' organization to speak to the class.

Topics for Discussion

Be prepared to discuss the following topics if you are asked to do so:

1. How do today's unions differ from those that existed in the last half of the nineteenth century?
2. What are the purposes of unionization?
3. Why are seven members needed to organize a union? If necessary, students may wish to write to the United Food and Commercial Workers International Union to find out.
4. Who does the negotiating for the employers at a meeting to discuss a contract?
5. Discuss the function of each of the following organizations:
    a. American Meat institute
    b. National Livestock and Meat Board
    c. California Beef Council
    d. American Sheep Producers Council

The instructor may assign students to do more research in one or more areas.

UNIT A—THE APPRENTICE MEATCUTTER

TOPIC 2—LABOR AND MANAGEMENT ORGANIZATIONS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Larger and more powerful labor unions first began to emerge after the American _1_ War. 1. ________

2. The first important nationwide labor union was the _2_ Labor Union, which was followed by the _3_ of Labor, which was organized on an _4_ basis. 2. ________ 3. ________ 4. ________

3. The American Federation of Labor is an organization made up of _5_ unions that function independently within their own fields. 5. ________

4. The Congress of Industrial Organizations was established to represent _6_ and _7_ employees in large industries. 6. ________ 7. ________

5. The affairs of the international butchers' union are managed by the _8_ board. 8. ________

6. The American Meat Institute is an _9_ organization. 9. ________

7. The California Beef Council was established by the action of the California _10_. 10. ________

8. The main objective of the American Sheep Producers Council is to promote the _11_ of lamb and wool products. 11. ________

9. The American Sheep Producers Council is governed by a _12_-member board of _13_. 12. ________ 13. ________

10. The National Livestock and Meat Board has researched the _14_ of meat in the _15_. 14. ________ 15. ________

UNIT A—THE APPRENTICE MEATCUTTER

TOPIC 3—PRINCIPLES AND PRACTICES OF SAFETY

This topic, "Principles and Practices of Safety," is planned to provide answers to the following questions:

- **How frequently do injuries occur in the meatcutting industry?**
- **What agency has responsibility for drawing up and enforcing safety orders in California?**
- **What are some general safety practices to be followed by the meatcutter?**

Labor Statistics and Research

According to the California State Department of Industrial Relations, work in the wholesale and retail meat industry can be described as hazardous. Many injuries are caused by the incorrect use of machines, lifting of heavy objects, and slipping on work surfaces; however, the leading cause of injuries is the incorrect use of knives. (See Table A-1.)

TABLE A-1

Disabling Work Injuries and Illnesses Under Workers' Compensation* in California, 1977

Area of work	*Occupation*		*Total*
	Meatcutters and butchers (excluding manufacturing)	*Meatcutters and butchers (manufacturing)*	
Containers	387	85	472
Chemicals	—	4	4
Furniture and fixtures	12	13	25
Hand tools	1,031	556	1,587
Hoisting apparatus and conveyors	24	18	42
Machines	584	62	646
Metal items	25	34	59
Vehicles	57	25	82
Wood items	15	8	23
Working surfaces	182	98	280
Other or not identified	757	470	1,227
Totals	3,074	1,373	4,447

Age of worker, years	*Occupation*		*Total*
	Meatcutters and butchers (excluding manufacturing)	*Meatcutters and butchers (manufacturing)*	
19 and under	117	42	159
20—24	582	166	748
25—29	482	178	660
30—34	421	180	601
35—39	271	160	431
40—44	189	126	315
45—49	189	113	302
50—54	140	90	230
55—59	130	64	194
60—64	112	38	150
65 and over	30	4	34
Age not identified	411	212	623
Totals	3,074	1,373	4,447

Item in use	*Occupation*		*Total*
	Meatcutters and butchers (excluding manufacturing)	*Meatcutters and butchers (manufacturing)*	
Knife (not powered)	939	476	1,415
Knife (powered)	15	6	21
Totals	954	482	1,436

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*Disability causing absence from work for a full day or shift beyond the day of the occurrence. Excludes injuries to employees not covered by the California Workers' Compensation Act, such as maritime workers, federal employees, and railroad employees in interstate commerce.

Importance of Safety

The safe way to do a job is the intelligent way to do it. If meatcutters do not work safely, they will obviously get hurt. The injury may lead to the loss of a finger, a hand, or a life. In other words, all the possessions that a worker and his or her family enjoy can be lost by one unsafe act. With all the hazards in the meatcutting trade, the apprentice should learn and practice safety.

If apprentices take an intelligent approach to their jobs and if safety has been integrated into the training, apprentice meatcutters will acquire safe habits in carrying out these jobs. Meatcutters should make a habit of using hand tools correctly, of taking care of power and hand tools correctly, and of always using guards on machines where guards are required for safety.

California Safety Orders

To promote the health and safety of its citizens, California established the Division of Occupational Safety and Health within the Department of Industrial Relations and empowered it to formulate orders. Safety and health orders are promulgated by the California Occupational Safety and Health Standards Board.

Long periods of research into accident records are needed to find out just what kind of accidents are occurring. Thousands of plants are inspected to view the conditions that are causing accidents, and thousands of actual accidents are investigated to determine the causes. Equipment manufacturers, unions, and trade associations are called on to contribute their views on safety and on unsafe conditions that need correcting. Finally, the Division of Occupational Safety and Health writes safety orders to correct the unsafe condition or conditions.

For example, the Division of Occupational Safety and Health did not on the spur of the moment decide to propose an order to guard meat grinders. Only after hundreds of accidents on meat grinders were investigated were orders given requiring the installation of guards. The manufacturers of all machines used in meat markets have cooperated with the Division in producing guards and have often redesigned their machines to incorporate safety principles.

California's *General Industry Safety Orders* are intended to be fair to the employer and the employee. The employer must furnish a machine that is as safe as possible, and the employee must use the machine in a safe manner. Either employer or employee may be guilty of a misdemeanor and may be penalized accordingly if he or she fails to live up to the provisions of specific safety orders.

If an employer or employee has a question regarding shop safety, he or she should contact the local office of the Division of Occupational Safety and Health.

General Safety Procedures

Safety procedures to be followed in the use of tools and equipment are discussed where the tools and equipment are described. The safety procedures discussed here are general in nature.

Hand Tools

All hand tools should be of the finest quality and must be taken care of to ensure safety and efficiency. The meatcutter's most important hand tools are knives. A sharp, clean knife is one of the marks of a meatcutter who is truly professional. In this course the apprentice meatcutter will learn how to use knives correctly and safely and how to care for them properly, including how to keep them sharp and in good working condition.

Safety Clothing

Because of the high number of injuries to meatcutters caused by the improper use of knives in the boning and breaking of meat, the apprentice meatcutter should wear a three-fingered glove and a protective apron (Figs. A-1 and A-2). The metal mesh glove is worn on the hand opposite to that holding the knife. In other words, the glove is worn on the hand that holds the meat while it is being cut.

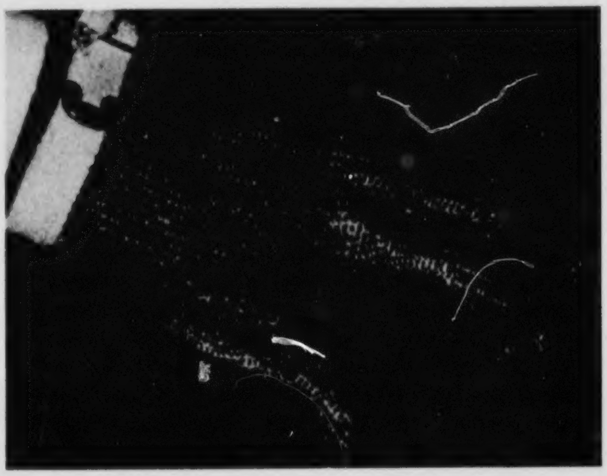


Fig. A-1. Three-fingered metal mesh glove

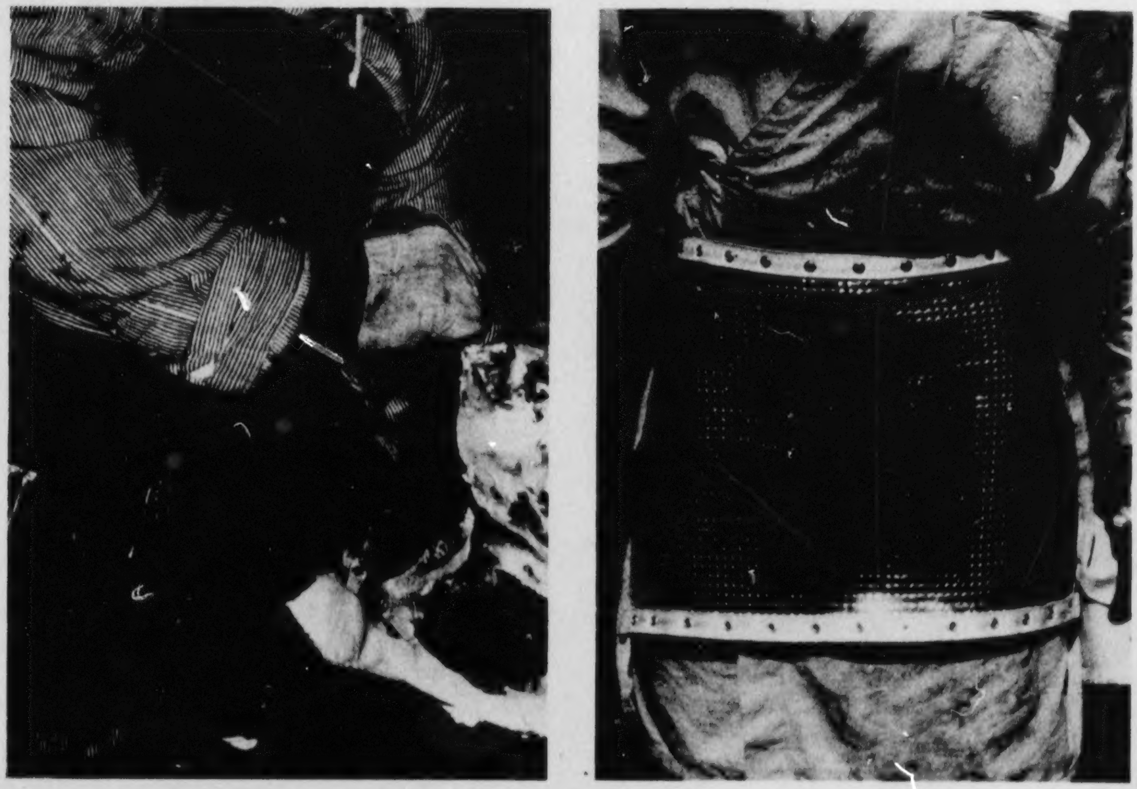


Fig. A-2. Leather, synthetic, and metal mesh aprons used as protectors

Power Tools

The safety rules to be observed when power tools are being used are the following:

1. Operate only machines to which you are assigned. If you are assigned to a machine with which you are unfamiliar, request more instructions. No one will think the less of you for admitting you need instructions, and obtaining such help may prevent a serious accident.
2. Do not hold a conversation with anyone operating a machine. To do so may distract the operator and cause him or her to be injured.
3. Do not wear gloves or a garment with loose sleeves when operating a machine. Tips of glove fingers and edges of sleeves have caught in moving parts and pulled the operator's hand into the machine. For the same reason, wristwatches and rings may prove hazardous.
4. Turn off the power to the machine as soon as you are through using it. Never leave a machine unattended, even for a minute, with the power on.
5. Do not clean, oil, or adjust a power tool or machine while it is running. Before cleaning or adjusting a machine, disconnect the cord supplying power to the machine or turn off the main power switch.
6. Clean every machine thoroughly at the end of each shift. If you are assigned this job, follow the manufacturer's manual as to the correct cleaning and oiling to be done daily. A maintenance manual for each machine is available from the manufacturer or local dealer. Remember that the job is not finished until all guards are correctly in place.

Lifting

To help prevent back strain resulting from unwise lifting of heavy quarters, sides of meat, or heavy equipment, the Division of Occupational Safety and Health suggests the following:

1. Get the center of the weight as high above the ground as possible. (Stand it up if it is a sack. Stand it on a corner if it is a box.)
2. Position the object as close as possible to your backbone, which is the supporting column for lifting.

3. Set your feet, legs, and back (keeping your back as nearly vertical as possible).
4. Lift with your arms first, and roll the object over your knees.
5. Pull the object as close to you as possible.
6. Stand up with the load, using your legs, thus placing little or no strain on your back.
7. If your assignment requires turning, turn your feet first, not your hips or shoulders.

Good Housekeeping

Safe operations require good housekeeping. Grease and blood should be removed from the floor immediately to prevent the formation of slippery spots. Salt may be sprinkled on potential slippery spots as an emergency measure. Pieces of fat should be picked up, and foreign matter that falls on the floor should be removed at once. Tools and equipment should be put away immediately after use. Objects left in front of switch panels or doors or in passageways even temporarily are dangerous.

Causes of Accidents

Accidents are caused by unsafe acts, unsafe conditions, or a combination of the two. The apprentice meatcutter should make studies of accidents that have occurred in his or her immediate area and then try to identify the causes.

One of the most important safety principles is that accidents do not "just happen." They are caused. They are caused by people, and they happen to people, particularly to those who:

- Break safety rules.
- Fail to use safety guards.
- Resent being corrected for ignoring instructions.
- Ignore good housekeeping and leave it to others.
- Think horseplay is funny.
- Are in too much of a hurry to think about safety.
- Do not realize that it is easier to prevent accidents than to suffer their consequences.
- Do not realize that small hand tools can cause serious injuries.
- Have not learned that the most effective "safety device" is the built-in attitude of safety awareness developed through sincere effort and habitual practice.

Note: The instructor may make arrangements with the local Red Cross chapter to have a representative give a lesson on first aid for cuts.

The instructor may obtain information on occupational safety and health standards from the Occupational Safety and Health Agency, U.S. Department of Labor, Washington, DC 20212. This information may be used by apprentices in the classroom or as the instructor desires.

Basic First Aid

Basic first aid is the care given in an emergency before full medical care can be obtained. The apprentice meatcutter should learn the following:

1. Location of the nearest emergency hospital or medical facility
2. Who to call in an emergency
3. Where to call in an emergency
4. Where the card with this information is posted
5. How to stop or control bleeding
6. What to do in case of a bad cut
7. What to do if hand is caught in a cubing or tenderizing machine
8. What to do if hand is caught in grinder
9. What to do in case of a serious fall
10. What to do in case of different kinds of shock
11. What to do in case of a cardiac problem
12. What to do in case of respiratory blockage or choking
13. What to do in case of seizures

Study Assignment

Standard First Aid and Personal Safety (may be obtained through a local office of the American Red Cross). Read "Introduction to First Aid," pp. 11—17; "Wounds," pp. 18—44; "Shock," pp. 60—65; "Respiratory Emergencies and Artificial Respiration," pp. 66—90; "Swallowed Objects and Choking," pp. 91—94; "Sudden Illness," pp. 170—76; "Dressing and Bandages," pp. 177—94; and "Short Distance Transfer," pp. 224—53.

Topics for Discussion

Be prepared to discuss the following topics if you are asked to do so.

1. If you know of anyone who has filed an accident claim, find out the facts and report to the class your findings.
2. If you have ever experienced or witnessed a severe accident on or off the job, give the class an account of how and why it happened, what its consequences were, and how it might have been prevented.
3. Clip and study newspaper accounts of work accidents. From the evidence provided, try to determine the basic causes of the accidents. Report your conclusions to the class.

UNIT A—THE APPRENTICE MEATCUTTER

TOPIC 3—PRINCIPLES AND PRACTICES OF SAFETY

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Among meatcutters the most common type of injury is that caused by the incorrect use of 1 .
1. ________

2. Enforcement of California safety orders has been entrusted to the Division of 2 3 and Health, Department of Industrial Relations.
2. ________
3. ________

3. Failure to observe provisions of California safety orders is punishable as a 4 .
4. ________

4. The meatcutter's most important tools are 5 .
5. ________

5. To prevent the common injuries that occur in the boning and breaking of meat, the meatcutter should wear a protective 6 and a 7 -fingered glove.
6. ________
7. ________

6. When operating a machine, the meatcutter should not wear 8 or a garment with 9 sleeves.
8. ________
9. ________

7. Every machine used should be cleaned thoroughly at the end of each 10 .
10. ________

8. To prevent back strain when lifting heavy objects, the meatcutter should get the 11 of the weight as high above the floor level as possible.
11. ________

9. The object to be lifted should be placed as close as possible to the lifter's 12 , and the back should be kept as 13 as possible while the object is being lifted.
12. ________
13. ________

10. Grease and 14 should be removed from the floor at once; if that is not possible, 15 may be sprinkled on the slippery spots as an emergency measure.
14. ________
15. ________

TOPIC 4—PRINCIPLES AND PRACTICES OF SANITATION

This topic, "Principles and Practices of Sanitation," is planned to provide answers to the following questions:

- **Why is cleanliness so important to the success of a market?**
- **What good housekeeping practices should be followed by the meatcutter?**
- **What sanitation practices should be followed by the meatcutter?**
- **Why is a good appearance important to the success of a market?**

Importance of Cleanliness

A clean market attracts customers. A dirty market or a meatcutter who appears untidy repels customers. Therefore, cleanliness of person and sanitation in the market are extremely important. Furthermore, a clean market is a safer place in which to work. If a machine is cleaned regularly, the cleaning job is never as great as or as hazardous as that needed for a machine on which several days' cuttings have accumulated.

The meatcutter handles raw food intended for human consumption. For this reason, city and state health regulations are strict, and the apprentice meatcutter should learn them well.

Good Housekeeping

Good housekeeping practices are essential to any sanitation program.

Wall Areas

At least once each week, the walls of the salesrooms, walk-in box, and cutting room should be washed thoroughly to remove accumulations of dust, dirt, and bloodstains and to prevent the accumulation of odors. The ceiling of the walk-in box should also be included in the weekly washing. Even though the ceiling does not get as dirty as the walls, it can collect odors. In washing the cooler, the meatcutter should pay special attention to the cracks, crevices, and corners where dirt tends to accumulate.

Particular care should be given to the walls of the cutting room. These walls should be of a material that is impervious to water so that they can be hosed down. A coating of waterproof white paint is recommended for these walls.

Floor Areas

The floor area in front of the showcase is as important to the appearance of the meat department as the appearance of the showcase itself. The floor should be kept clean at all times, and paper and other debris should be picked up to maintain a good appearance and guarantee accessibility to the case. All floors and walls should be cleaned daily with a water pressure gun.

Floors should be clear of papers, boxes, and other debris for good sanitation and safety. Floors that are wet with the blood drippings of meat, water from overhead cooling units, and the like should be cared for immediately and the cause corrected. These situations are unsanitary and present a safety hazard.

Tools and Equipment

The proper methods of caring for hand and power tools are discussed in the topics in which they are introduced. The information given here is general.

Every part of the showcase should be washed at least once a week with a hot water pressure gun. When greens are used as part of the display, they too should be washed regularly.

Blocks, benches, and shelves should be cleaned daily, and the block should be scraped often enough to keep it clean and sanitary. Plumbing in the cutting room and cooler should be efficient and well insulated, and the ventilation and lighting should be adequate.

Racks and shelves in the walk-in box should not be used as catchalls. The paper lining on the shelves should be changed often. If the quarters of meat are dated as they are brought into the market, the meatcutters can determine which should be used first. The racks and meat hooks in the walk-in box should be scrubbed weekly along with the rest of the box. The meatcutter should make sure that both are made of material that does not rust easily. The scrap barrels must be emptied and washed with hot water at least once a day. In addition to the regular cleaning, steam cleaning of trees, pans, carts, luggers, and other equipment should be done several times a year by workers from outside firms who specialize in such work.

To prevent fire hazards, boxes or papers should not be allowed to accumulate in the department, particularly around electrical equipment.

Sanitation Procedures

Hand and power tools should be cleaned daily or more frequently if necessary. When a change is made from cutting pork to cutting beef, for example, the mill should be cleaned thoroughly to eliminate the possibility that customers might contract trichinosis by eating raw or rare meat with pork in the mixture. When pork is cut with a saw and a change is made to cutting beef, the saw and tables should be thoroughly cleaned to guarantee sanitation and to preserve the color of the beef. The juices of pork products make beef turn dark.

Meatcutters must always practice safety when they are cleaning their equipment. The sharp edges of knives, cleavers, saw blades, grinder blades, cubing machine blades, and templates of patty makers are the cause of many cuts. Injury from falling parts of saws, grinders, cubing machines, patty makers, and other equipment has to be recognized as a possibility in cleaning this equipment. Getting the hands and fingers lodged in the equipment is another hazard of cleaning.

The meat department should be free from dust and from odors from the dressing rooms and rest rooms. Flies, rats, mice, and other vermin must be kept out; however, poisons of any kind should not be used in the rooms where meat is cut, stored, or handled. Dogs or cats should never be allowed into the meat department.

The rest room should be cleaned daily, and ample supplies of paper towels should be provided. Meat odors that cling to the hands may be removed by adding a small amount of common table salt to the water in which hands are washed. Ample locker space should be provided for workers' coats, aprons, and smocks. Clean linen for the market should be kept in a clean, dry place to prevent its being exposed to dirt. A hamper or basket should be provided for the collection of dirty linen. Towels, aprons, and smocks should be used only for the purposes for which they are intended, not to wipe shoes or machinery. When employees of the store go to the rest-room area, they should wash their hands thoroughly before returning to work. The law requires that they do so.

Personal Hygiene

Of equal importance with the appearance of the meat department is the physical appearance of the meatcutter. Every meatcutter should practice the following rules of hygiene:

1. Wash hands with soap and water before reporting for work.
2. Keep fingernails clean and trimmed.
3. Keep hair clean and well groomed.
4. Keep mustaches clean, short, and well groomed.
5. Brush teeth regularly.
6. Take care of dental needs on a regular basis.
7. Use facial tissue in place of handkerchiefs.
8. Bathe regularly to avoid body odors.
9. Ensure that clothing is clean and pressed.
10. Keep shoes in good condition.
11. Do not smoke in food preparation areas.
12. Do not use snuff or chew tobacco in food preparation areas.
13. Do not drink alcohol on the job.
14. Do not report for work in a drunken condition.
15. Remove knives and sheath before going to the rest room.
16. Wash hands before leaving the rest room.
17. Do not wear knives and sheath while waiting on customers.
18. Renew health cards before they expire.
19. Wear a clean apron and smock.

The meatcutter's appearance, just as that of the meat department, is important to the customer as an indication of the cleanliness and sanitation practiced in handling meat.

Topics for Discussion

Be prepared to discuss the following topics if you are asked to do so:

1. Can an unclean market be hazardous? If it is hazardous, what existing conditions are causing the hazard?
2. What effect does an unclean employee or shop have on the customer?
3. Do you wash your hands when leaving the rest room? Have you read the sign in the rest room?
4. Observe local markets for cleanliness and possible safety hazards caused by unclean conditions. Make a report to the class.

UNIT A—THE APPRENTICE MEATCUTTER

TOPIC 4—PRINCIPLES AND PRACTICES OF SANITATION

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Good sanitation in the meat department and good personal hygiene on the part of employees attracts _1_ and prevents _2_.
   1. ________
   2. ________

2. The walls of the salesrooms, walk-in box, and cutting room should be washed thoroughly at least once a _3_.
   3. ________

3. Every part of the showcase should be washed at least once a _4_ with a _5_ water pressure gun.
   4. ________
   5. ________

4. All floors should be cleaned _6_ with a water pressure gun.
   6. ________

5. To make sure that meat is used according to its freshness, the meatcutter may wish to _7_ each quarter as it is brought into the market.
   7. ________

6. Hand and power tools should be cleaned at least _8_.
   8. ________

7. When a change is made from cutting pork to cutting beef, the _9_ should be cleaned thoroughly to prevent the possibility of the spread of _10_.
   9. ________
   10. ________

8. The juices of pork products should not be allowed to mingle with beef to prevent _11_ of the beef.
   11. ________

9. In attempts to get rid of vermin, _12_ should not be used where meat is cut, stored, or handled, nor should _13_ be allowed to come into the meat department.
   12. ________
   13. ________

10. The rest room should be cleaned _14_; when employees use the rest room, they must wash their hands, as required by _15_.
    14. ________
    15. ________

UNIT B APPLIED ARITHMETIC

TOPIC 1—ARITHMETIC

This topic, "Arithmetic," is planned to provide answers to the following questions:

- **What kind of problems in arithmetic is the meatcutter expected to solve?**
- **What are the principles of addition, subtraction, multiplication, and division?**

Apprentice meatcutters will fail in their trade if they do not learn the correct ways to cut and care for meat; apprentices will also fail if they cannot do basic mathematics. Some examples of the kinds of problems meatcutters are expected to solve are the following:

1. *Addition:* What is the total cost of beef priced at $1.03 per pound (0.5 kilogram), pork priced at $2.47 per pound (0.5 kilogram), and wieners priced at $0.40 per pound (0.5 kilogram)?
2. *Subtraction:* How much profit can be expected if meat costs $1.22 per pound (0.5 kilogram) and sells for $1.50 per pound (0.5 kilogram)?
3. *Multiplication:* What is the selling price of 3 pounds (1.4 kilograms) of beef if it is priced at $0.50 per pound (0.5 kilogram)?
4. *Division:* What is the price per pound (0.5 kilogram) of pork if the total price for 4 pounds (1.8 kilograms) is $2.25?
5. *Combination:* A forequarter of beef weighing 180 pounds (81 kilograms) is purchased at $35 per hundredweight. Total sales of the forequarter, when broken, are $5.70, $8.20, $3.00, $1.50, $4.33, $8.70, $6.00, $0.89, $5.24, $2.20, $7.13, $2.12, $4.40, $5.19, and $5.40. How much gross profit is made?

Study Assignment

Glen M. Hobbs and James McKinney. *Practical Mathematics* (Third edition). Chicago: American Technical Society, 1973. Work practice problems 1 through 3, p. 7; 1 through 3, p. 11; 1 through 7, p. 15; and 1 through 7, p. 21. Complete the final examination on pp. 22—24.

UNIT B—APPLIED ARITHMETIC

TOPIC 2—FRACTIONS (PART 1)

This topic, "Fractions (Part 1)," is planned to provide answers to the following questions:

- **What are the basic rules for working with fractions?**
- **What are the different types of fractions?**
- **How are fractions added and subtracted?**

Fractions are important to the meatcutter, because meat is seldom cut into pieces that weigh exact pounds (or kilograms). The meatcutter must, therefore, understand and be able to use fractions, which are parts of whole numbers. The fractions with which the meatcutter works most often are sixteenths because 16 ounces equal 1 pound (0.5 kilogram). For example, 3 pounds 8 ounces = 3½ pounds (1.8 kilograms), and 2 pounds 4 ounces = 2¼ pounds (1.01 kilograms).

Study Assignment

Hobbs and McKinney. *Practical Mathematics* (Third edition). Work practice problems 1 through 12, p. 77; 1 through 12, p. 80; and 1 through 10, p. 83.

UNIT B—APPLIED ARITHMETIC

TOPIC 3—FRACTIONS (PART 2)

This topic, "Fractions (Part 2)," is planned to provide answers to the following questions:

- **What are the rules for multiplying and dividing fractions?**
- **How does one deal with complex fractions?**
- **Can all fractions be changed to decimals?**

This topic deals with the further manipulation of fractions; that is, the multiplication, division, and handling of complex fractions. All are practices meatcutters use daily when they encounter such problems as determining the total weight of sausage in packages weighing 1¾ pounds (0.79 kilogram), 2 pounds (0.9 kilogram), and ½ pound (0.23 kilogram); or determining into how many ¾-pound (0.34-kilogram) packages 6 pounds (2.7 kilograms) of ground beef can be divided.

Study Assignment

Hobbs and McKinney. *Practical Mathematics* (Third edition). Work practice problems 1 through 4, p. 97; 5 through 16, pp. 101—102; 1 through 6, p. 104; 7 through 15, p. 105; 1 through 9, p. 113; 1 through 6, p. 116; 1 through 6, p. 117; and 1 through 5, p. 120.

UNIT B—APPLIED ARITHMETIC

TOPIC 4—DECIMALS

This topic, "Decimals," is planned to provide answers to the following questions:

- **What are the rules for adding, subtracting, multiplying, and dividing decimals?**
- **Can fractions be changed to decimals?**
- **Can decimals be changed to fractions?**

Decimals are also important to meatcutters. Not only do they use fractions of whole numbers as such, but they also convert fractions to decimals. The following conversion-factor chart is useful in computing costs of cuts of meat.

Study Assignment

Hobbs and McKinney. *Practical Mathematics* (Third edition). Work the problems in the self-check test on p. 153 and in the final examination on pp. 154—55.

Conversion-Factor Chart

Ounces	*Pound*	*Grams*
1	0.062	28
2	0.125	56
3	0.188	84
4	0.250	112
5	0.312	140
6	0.375	168
7	0.438	196
8	0.500	224
9	0.562	252
10	0.625	280
11	0.688	308
12	0.750	336
13	0.812	364
14	0.875	392
15	0.938	420
16	1.000	448

UNIT B—APPLIED ARITHMETIC

TOPIC 5—PERCENTS

This topic, "Percents," is planned to provide answers to the following questions:

- **Why does the meatcutter have to figure percentages?**
- **How is the percent of profit determined?**
- **How are prices marked up or discounted?**

Percents, which must be calculated in terms of decimals, are important to the apprentice meatcutter. The journey-level worker, the manager, and the owner of a meat market must know how to figure markup, selling price, and discounts in percents if they are to operate a profitable business.

The importance of percents in the meatcutting trade is illustrated by the following problems:

1. If a leg of lamb normally comprises 26 percent of the total weight of a lamb carcass, what is the weight of a leg of lamb in a carcass weighing 45 pounds (20 kilograms)?
2. To operate at a profit, a meat department must sell certain cuts of meat at 15 percent over cost. It must, therefore, sell cuts of meat costing $0.62 at what price per pound (0.5 kilogram [illegible]

In the meatcutting trade percents are usually carried out to three places beyond the decimal (e.g., 5.386). In figuring money, however, only two places are used. If the third number to the right of the decimal is 5 or larger, however, 1 is added to the number in the second space. If the third figure is less than 5, it is dropped. For example, $54.636 becomes $54.64, and $54.632 becomes $54.63.

Study Assignment

Hobbs and McKinney, *Practical Mathematics* (Third edition). Study pp. 161—84.

UNIT B—APPLIED ARITHMETIC

TOPIC 6—ARITHMETIC APPLIED TO INVENTORY

This topic, "Arithmetic Applied to Inventory," is planned to provide answers to the following questions:

- **How is inventory used in determining profit?**
- **When should inventories be taken?**

Determining Profit Through Inventory

The purpose of being in business is to make a profit. A profitable business cannot be run without taking inventories periodically. In the meat industry, inventories are taken every four weeks. An example of how to calculate profits by including inventory is given as follows:

Basic Figures

Sales	$48,365
Purchases	34,192
Previous inventory	6,275
Present inventory	5,882
Wages	4,031
Expenses (wages not included)	6,793

Procedure

1. Find gross profit.
2. Find percent of gross profit.
3. Find percent of wages (carry out to three places).
4. Find percent of expenses, wages included (carry out to three places).
5. Find percent of net profit.
6. Find net profit.

Calculation

1. To find gross profit:

   Add:

Purchases	$ 34,192
Previous inventory	+6,275
	40,467
Subtract present inventory	-5,882
Result—cost of merchandise sold in four weeks	$ 34,585
Subtract total from sales	$ 48,365
	-34,585
Gross profit	$ 13,780

2. To find percent of gross profit:

   Divide gross profit by sales.

```
              0.284 = 28.4 percent
48,365 ) 13,780.000
          9 673 0
          4 107 00
          3 869 20
            237 800
            193 460
             44 340
```

3. To find percent of wages:

   Divide sales into wages.

```
              0.083 = 8.3 percent
48,365 ) 4,031.000
         3 869 20
           161 800
           145 095
            16 705
```

4. To find percent of expenses (wages included):

   Add:

Wages	4,031
Expenses	+6,793
	10,824

Divide sales into expenses (including wages).

```
              0.223 = 22.3 percent
48,365 ) 10,824.000
          9 673 0
          1 151 00
            967 30
            183 700
```

5. To find new profit:

Subtract total expenses from gross profit to get amount of net profit.

$$\begin{array}{r} 13{,}780 \\ \underline{-10{,}824} \\ 2{,}956 \end{array}$$

6. To find percent of net profit:

Divide sales into net profit.

$$\begin{array}{r@{}l} 0.06 & = 6 \text{ percent} \\ 48{,}365\overline{)2{,}956.00} & \\ \underline{2\ 901\ 90} & \\ 54\ 10 & \end{array}$$

UNIT B—APPLIED ARITHMETIC

TOPIC 6—ARITHMETIC APPLIED TO INVENTORY

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The cost of merchandise is determined by subtracting present inventory from _1_ and previous inventory. 1. ________

2. Gross profit is calculated by subtracting the cost of merchandise from _2_. 2. ________

3. The percent of expenses is calculated by _3_ expenses by sales. 3. ________

4. The amount of _4_ profit is found by subtracting total expenses from gross profit. 4. ________

5. To find percent of wages, one must divide _5_ by sales. 5. ________

UNIT B—APPLIED ARITHMETIC

TOPIC 7—CARCASS CHARTS AND CUTTING TESTS

This topic, "Carcass Charts and Cutting Tests," is planned to provide answers to the following questions:

- **Why are cutting tests important in determining profit?**
- **How does the meatcutter use carcass charts?**

The cutting tests presented in this topic are important in helping the meatcutter learn how to estimate profit and loss. Such tests can be used in the process of learning how to determine what the selling price of each cut of meat should be considering costs and the desired profit. Prices vary considerably on the different cuts of meat because of seasonal demand. For example, steaks are more in demand in the summer, and stews and roasts are more in demand in the winter. Demand also varies from one geographical area to another. However, if the price of one cut is lowered, then the price of another cut must be raised to compensate for the loss so as to cover expenses and provide for a profit.

A cutting test can be used as a model or formula for the raising and lowering of prices, whether the price changes are caused by fluctuations in the wholesale market or by management's attempts to balance inventories.

Carcass charts, such as those shown in this topic, can help the beginning meatcutter learn where on the animal the different cuts of meat are located. The charts can be used in pricing the different cuts so as to cover costs and provide for profit when the market has to use primal cuts to meet consumer demand. The charts can be used also in determining how many carcasses must be purchased to provide a given number of primal cuts.

Lamb Carcass Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
65.50 (29.47)	Carcass	$1.20	$78.60	
3.83 (1.72)	Neck stew	$1.18	$ 4.52	5.84
15.69 (7.06)	Leg of lamb	2.08	32.64	23.97
5.32 (2.12)	Small loin chops	3.08	16.38	8.12
3.99 (1.79)	Rib chops	2.98	11.90	6.06
3.02 (1.35)	Large loins	2.98	9.00	4.61
4.64 (2.08)	O-bone chops	2.38	11.04	7.08
6.83 (3.07)	Shoulder chops	2.08	14.21	10.43
4.87 (2.19)	Riblets	1.18	5.75	7.43
0.96 (0.43)	Boneless stew	1.18	1.13	1.46
3.03 (1.36)	Shank	0.98	2.97	4.62
0.27 (0.12)	Kidney	1.18	0.32	0.41
3.34 (1.50)	Bone	0.00	0.00	5.10
8.55 (3.84)	Fat	0.00	0.00	13.05
64.34 (28.63)	TOTAL		$109.86	98.18%
	Percent of gross profit			29.16%
1.16 (0.52)	Cutting loss			1.82%
	Average selling price per pound (0.5 kilogram)	$1.694		
	Profit		$32.36	

Pork Loin Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
85.00 (38.25)	Whole pork loins	$1.01	$85.85	
12.48 (5.61)	Loin chops	$1.88	$21.96	14.68
4.36 (1.96)	Loin chops thin	2.18	9.50	5.13
26.07 (11.73)	Rib chops	1.68	43.80	30.67
11.80 (5.31)	Farmer style spareribs	1.37	16.16	13.88
4.75 (2.13)	Farmer spareribs	1.98	9.40	5.59
5.10 (2.29)	Sirloin chops	1.59	8.10	6.00
7.98 (3.59)	Sirloin end roast	1.28	10.22	9.39
1.62 (0.72)	Tenderloin	2.38	3.84	1.90
2.92 (1.31)	Chop suey meat	1.98	5.78	3.44
6.35 (2.85)	Waste fat	0.00	0.00	7.35
83.43 (37.54)	TOTALS		$128.76	98.03%
	Average selling price per pound (0.5 kilogram)	$ 1.515		
1.57 (0.70)	Cutting loss			1.97%
	Gross profit		$42.95	
	Percent of gross profit			33.35%

Boneless Beef Round Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
79.00 (35.55)	Boneless round	$1.36	$107.44	
19.19 (8.63)	Round steak	$1.89	$36.27	24.29
6.68 (3.00)	Top round steak	2.09	13.96	8.46
3.88 (1.74)	Bottom round steak	1.99	7.72	4.91
3.52 (1.58)	Swiss steak	1.89	6.65	4.45
15.19 (6.83)	Sirloin tip	1.99	30.23	19.24
14.28 (6.42)	Rump roast	1.98	26.99	18.08
6.36 (2.86)	Boneless stew meat	1.89	11.96	8.05
6.30 (2.83)	Trim	1.79	11.28	7.97
2.00 (0.90)	Fat	0.08	0.16	2.53
1.60 (0.72)	Cutting loss	0.00	0.00	2.03
79.00 (35.51)	TOTAL (average selling price per pound)	$1.56	$145.22	100.01%
79.00 (35.55)	Cost per pound	1.36	107.44	
	Gross profit		$37.78	28.47%

Beef Bone-in Round Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
73.00 (32.85)	Bone-in round	$1.03	$75.19	
17.44 (7.84)	Round steak bone-in	$1.89	$32.96	23.90
6.45 (2.90)	Sirloin tip	1.99	12.84	8.84
5.93 (2.66)	Swiss steak	1.89	11.21	8.12
9.38 (4.22)	Rump roast	1.88	17.63	12.86
5.24 (2.35)	Stew	1.89	9.90	7.18
2.02 (0.90)	Cube steak	2.49	5.03	2.77
4.88 (1.95)	Grounding trim	1.59	7.75	6.68
10.75 (4.30)	Fat	0.08	0.86	14.73
1.50 (0.67)	Bone (marrow)	0.19	0.29	2.00
7.81 (3.51)	Bones	0.01	0.08	10.70
1.60 (0.72)	Cutting loss	0.00	0.00	2.19
73.00 (32.85)	TOTAL (average selling price per pound) (0.5 kilogram)	$1.26	$98.55	99.97%
73.00 (32.85)	Cost per pound	1.03	75.19	
	Gross profit		$23.36	30.02%

Beef Loin Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
57.50 (25.87)	Beef loin	$1.29	$74.18	
7.88 (3.54)	Top sirloin steak	$2.89	$22.77	13.70
2.75 (1.23)	Beef tenderloin steak	4.39	12.07	4.78
6.28 (2.82)	Porterhouse steak	2.79	17.52	10.92
5.60 (2.52)	T-bone steak	2.69	15.06	9.74
2.69 (1.21)	Club steak	2.59	6.97	4.68
2.53 (1.13)	New York steak	3.98	10.07	4.40
1.13 (0.50)	Cube steak	2.59	2.93	1.97
5.94 (2.67)	Lean trim	1.69	10.04	10.33
6.31 (2.83)	Bones	0.01	0.06	10.97
15.25 (6.86)	Fat	0.08	1.22	26.52
1.14 (0.51)	Cutting loss	0.00	0.00	1.99
57.50 (25.87)	TOTAL (average selling price per pound) (0.5 kilogram)	$1.70	$98.71	100.00%
57.50 (25.87)	Cost per pound	1.29	74.18	
	Gross profit		$24.53	24.77%

Square Chuck Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
50.30 (22.63)	Square chuck	$0.88	$44.26	
6.97 (3.13)	Blade cut chuck roast	$1.08	$7.53	13.86
11.37 (5.10)	7-bone chuck roast	1.49	16.94	22.60
2.04 (0.91)	O-bone or arm roast	1.59	3.24	4.06
9.32 (4.19)	Boneless English or clod roast	1.89	17.61	18.53
6.33 (2.84)	Boneless stew meat	1.89	11.96	12.58
3.88 (1.74)	Trim	1.49	5.78	7.71
5.92 (2.66)	Bones	0.01	0.06	11.77
3.22 (1.44)	Fat	0.08	0.25	6.40
1.25 (0.56)	Cutting loss	0.00	0.00	2.48
50.30 (22.63)	TOTAL (average selling price per pound) (0.5 kilogram)	$1.25	$63.37	99.99%
50.30 (22.63)	Cost per pound	0.88	44.26	
	Gross profit		$19.11	30.05%

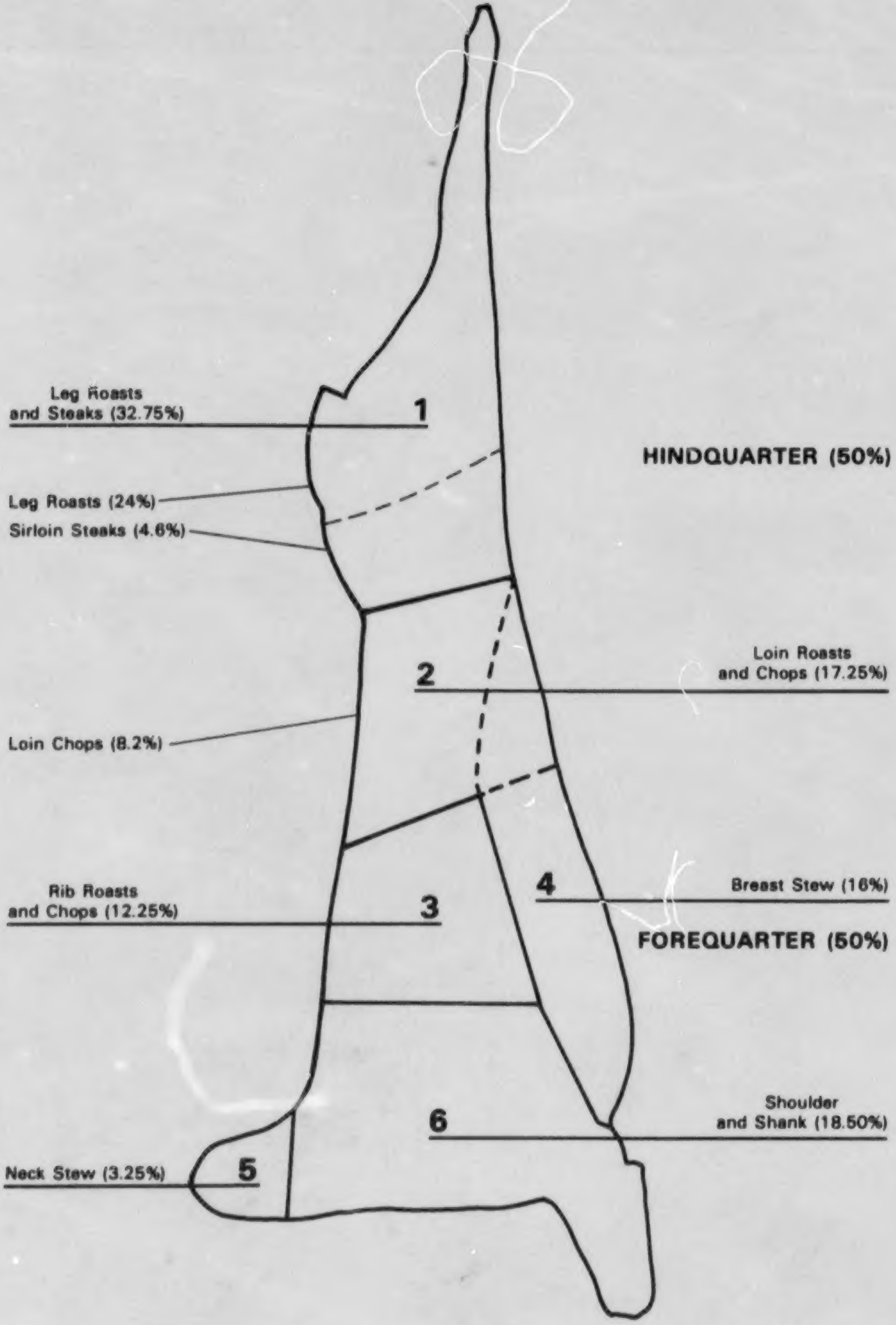
Beef Prime Rib Cutting Test

Weight, pounds (kilograms)	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
39.07 (17.58)	Prime rib	$1.37	$53.53	
11.99 (5.39)	Rib steak	$2.19	$26.26	30.69%
3.87 (1.74)	Spencer steak	3.49	13.50	9.90
9.83 (4.42)	Rib roast	2.09	20.54	25.17
5.62 (2.52)	Rolled roast	2.69	15.12	14.38
1.66 (0.74)	Short ribs	1.49	2.47	4.25
1.70 (0.76)	Trim	1.19	2.02	4.35
1.72 (0.77)	Bones	0.01	0.02	4.40
1.94 (0.87)	Fat	0.08	0.15	4.97
0.74 (0.33)	Cutting loss	0.00	0.00	1.89
39.07 (17.58)	TOTAL (average selling price per pound) (0.5 kilogram)	$2.05	$80.08	100.00%
39.07 (17.58)	Cost per pound	1.37	53.53	
	Gross profit		$26.55	33.07%

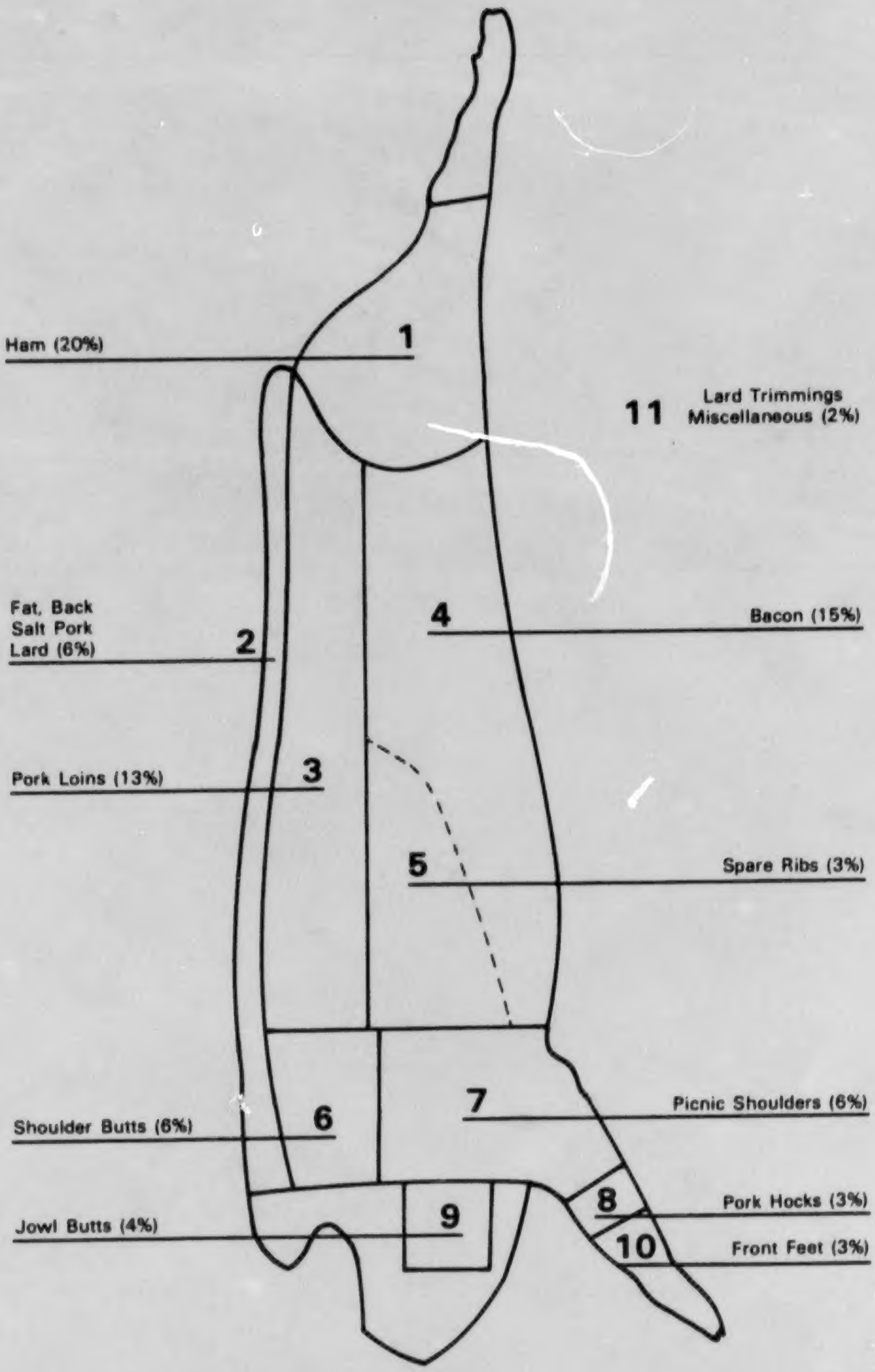
Side of Beef Cutting Test

Weight, pounds	*(kilograms)*	*Name of cut*	*Price per pound (0.5 kilogram)*	*Total*	*Percent*
360.00	(162.00)	Side of beef	$0.99	$356.40	100.00
90.30	**(40.63)**	**Chuck (primal)**			**25.22**
16.20	(7.29)	Cross rib or clod	$1.89	$30.62	4.50
3.10	(1.39)	English cut roast	1.59	4.93	0.83
8.90	(4.00)	Blade cut roast	1.09	9.70	2.47
19.00	(8.55)	7-bone roast	1.39	26.41	5.28
14.50	(6.52)	Lean meat	1.98	28.71	4.03
8.70	(3.91)	Trim	1.29	11.22	2.42
19.90	(8.95)	Waste	0.05	1.00	5.53
15.10	**(6.79)**	**Brisket (primal)**			**4.22**
7.00	(3.15)	Roast	$1.98	$13.86	1.94
8.10	(3.64)	Waste	0.05	0.40	2.25
10.70	**(4.81)**	**Shank (primal)**			**0.97**
3.50	(1.57)	Cut shank	$1.69	$5.92	2.97
2.70	(1.21)	Lean meat	1.98	5.35	0.75
2.30	(1.03)	Soup bone	0.49	1.13	0.65
2.20	(0.99)	Waste	0.05	0.11	0.61
29.20	**(13.14)**	**Plate (primal)**			**8.17**
17.60	(7.92)	Trim	$1.29	$22.70	4.89
11.60	(5.22)	Waste	0.05	0.58	3.22
34.30	**(15.43)**	**Rib (primal)**			**9.53**
10.20	(4.59)	Rib roast	$1.99	$20.30	2.83
10.20	(4.59)	Rib steaks	2.29	23.36	2.83
1.80	(0.81)	Lean meat	1.98	3.56	0.50
3.00	(1.35)	Short rib	1.19	3.57	0.83
3.00	(1.35)	Trim	1.29	3.87	0.83
6.10	(2.74)	Waste	0.05	0.30	1.68
73.30	**(32.98)**	**Loin (primal)**			**20.25**
2.40	(0.96)	Tenderloin	$4.98	$11.95	0.67
9.10	(4.09)	Top sirloin	3.09	28.12	2.56
10.00	(4.50)	T-bone steak	2.99	29.90	2.78
9.00	(4.05)	Porterhouse steak	3.09	27.81	2.50
6.10	(2.74)	Lean trim	1.98	12.08	1.69
5.80	(2.61)	Trim	1.29	7.48	1.61
0.90	(0.40)	Kidney	0.98	0.88	0.25
30.00	(13.50)	Waste	0.05	1.50	8.33

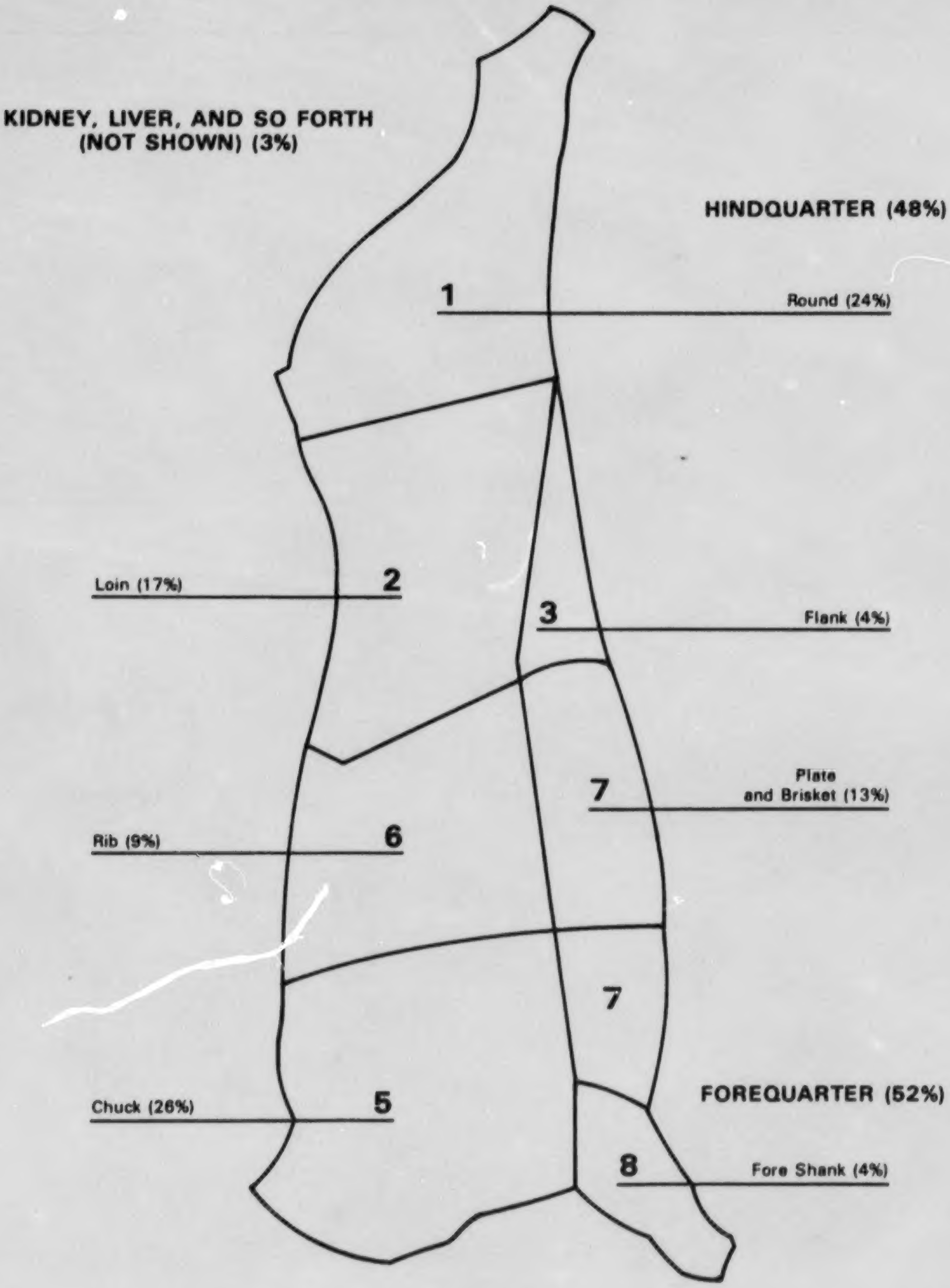
62.80	**(28.26)**	**Round (primal)**			**17.58**
11.70	(5.26)	Rump roast	$1.98	$23.17	3.25
16.10	(7.24)	Round	1.98	31.88	4.47
3.10	(1.39)	Tenderized round steak	2.08	6.45	0.86
4.00	(1.80)	Top round steak	2.18	8.72	1.11
3.00	(1.35)	Swiss steak	1.98	5.94	0.83
5.70	(2.56)	Lean trim	1.98	11.29	1.58
3.00	(1.35)	Trim	1.29	3.87	0.83
16.20	(7.29)	Waste	0.05	0.81	4.50
17.60	**(7.92)**	**Sirloin tip (primal)**			**4.95**
6.00	(2.70)	Tip steak	$2.38	$14.28	1.67
5.80	(2.61)	Tip roast	2.29	13.29	1.61
2.80	(1.26)	Trim	1.29	3.61	0.78
3.00	(1.35)	Waste	0.05	0.15	0.83
23.50	**(10.57)**	**Flank (primal)**			**6.61**
2.00	(0.90)	Steak	$2.28	$4.56	0.56
5.20	(2.34)	Trim	1.29	6.71	1.44
16.30	(7.33)	Waste	0.05	0.82	4.53
356.80	(160.56)	TOTAL		$472.87	
3.20	(1.44)	Cutting loss			0.90%
		Cost		356.40	
		Gross profit		$116.47	25.03%


Leg Roasts and Steaks (32.75%)
1
HINDQUARTER (50%)
Leg Roasts (24%)
Sirloin Steaks (4.6%)
2
Loin Roasts and Chops (17.25%)
Loin Chops (8.2%)
4
Breast Stew (16%)
Rib Roasts and Chops (12.25%)
3
FOREQUARTER (50%)
6
Shoulder and Shank (18.50%)
Neck Stew (3.25%)
5

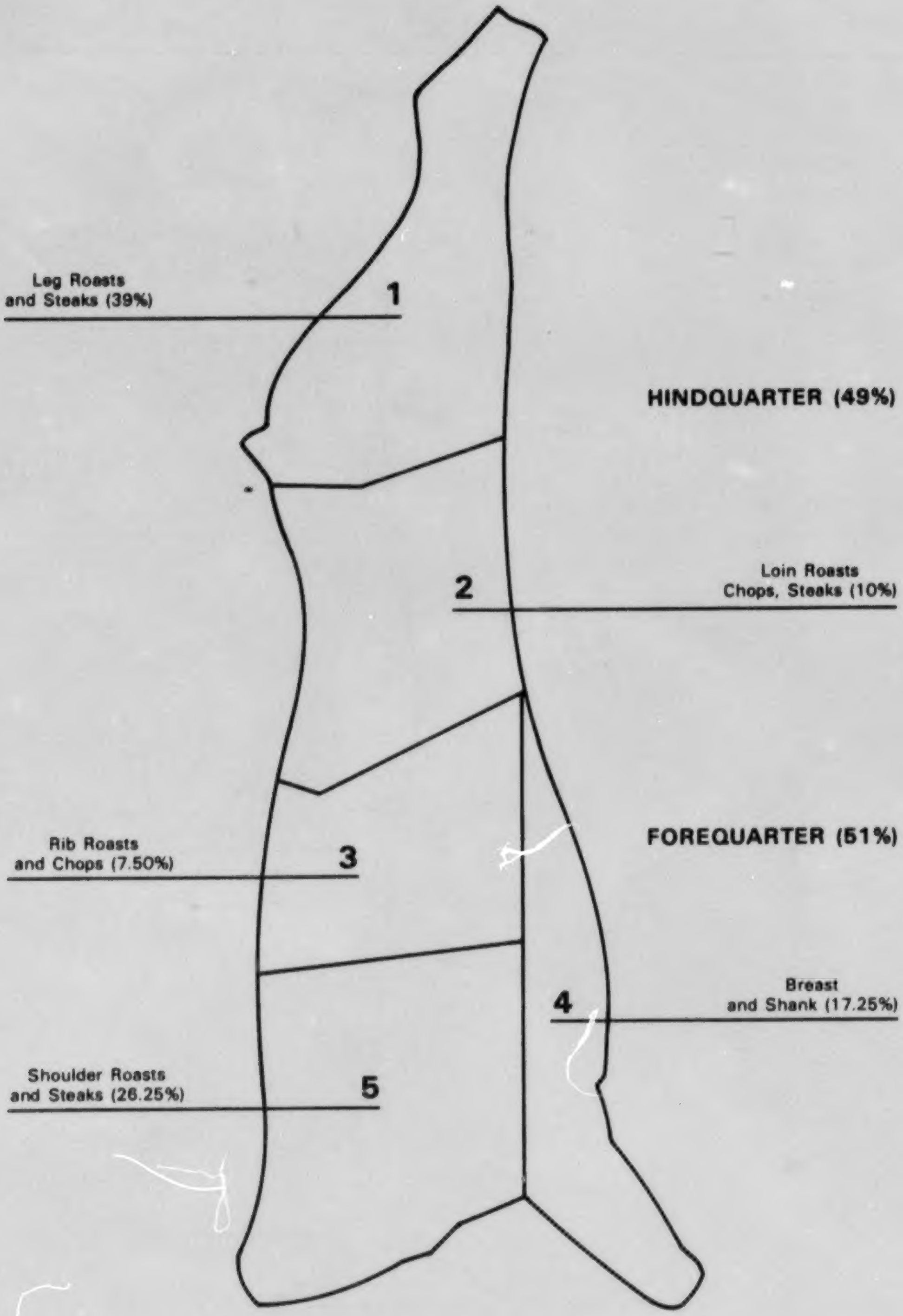
LAMB


Ham (20%) 1
11 Lard Trimmings Miscellaneous (2%)
Fat, Back Salt Pork Lard (6%) 2
4 Bacon (15%)
Pork Loins (13%) 3
5 Spare Ribs (3%)
7 Picnic Shoulders (6%)
Shoulder Butts (6%) 6
8 Pork Hocks (3%)
Jowl Butts (4%) 9
10 Front Feet (3%)

PORK


KIDNEY, LIVER, AND SO FORTH (NOT SHOWN) (3%)
HINDQUARTER (48%)
1
Round (24%)
Loin (17%)
2
3
Flank (4%)
7
Plate and Brisket (13%)
Rib (9%)
6
7
Chuck (26%)
5
FOREQUARTER (52%)
8
Fore Shank (4%)

BEEF


Leg Roasts
and Steaks (39%)
1
HINDQUARTER (49%)
Loin Roasts
Chops, Steaks (10%)
2
FOREQUARTER (51%)
Rib Roasts
and Chops (7.50%)
3
Breast
and Shank (17.25%)
4
Shoulder Roasts
and Steaks (26.25%)
5

VEAL

46

UNIT B—APPLIED ARITHMETIC

TOPIC 8—DETERMINING SELLING PRICE

This topic, "Determining Selling Price," is planned to provide answers to the following questions:

- **How is the new selling price calculated when prices are increased?**
- **How is the new selling price calculated when prices are decreased?**

When prices are increased or decreased, several procedures are available to obtain the new selling price and maintain the same percent of markup.

Determining Selling Price—Example 1

Basic Figures

Beef cost 42 cents per pound (0.5 kilogram).
Selling price of T-bone steak was $1.49 per pound.
Beef price was increased to 45 cents per pound.
What is new selling price of T-bone?

Procedure

1. Divide old cost by the old selling price (s/p), and the result will be the old cost in percent.
2. Divide new cost by old cost in percent, and the result will be the new selling price.

Calculation

$$\frac{\text{old selling price} \times \text{new cost}}{\text{old cost}} = \text{new selling price}$$

$$\frac{\text{old s/p } 1.49 \times 0.45 \text{ new cost}}{0.42 \text{ old cost}} = \text{new selling price}$$

```
                    1.59  or  1.60  =  new selling
0.6705 ÷ 0.42 = 42 / 67.05             price
                     42
                     25 0
                     21 0
                      4 05
                      3 78
                        27
```

Note: The instructor may wish to present additional problems. Pork loin may be divided into rib-end roast, loin-end roast, center-rib pork chops, center-loin pork chops, and so forth.

Determining Selling Price—Example 2

Basic Figures

Packing house cut—standing rib roast
Weight: 28 pounds (12.6 kilograms)
Cost: 60 cents per pound (0.5 kilogram)
Markup: 35 percent
Short ribs: 7 pounds (3.2 kilograms)
Sold for 59 cents per pound from standing rib
Trimming and waste: 2 pounds (0.9 kilogram)
Balance of standing rib weighed 19 pounds (8.6 kilograms)

Procedure

1. Find selling price of short ribs.
2. Find selling price of standing rib (both total price and price per pound).
3. Find profit in dollars and cents.

Calculation

Cost of standing rib roast: 0.60 X 28 pounds (12.6 kilograms) = 16.80
To find selling price, subtract 35 percent from 100 percent, which leaves 65 percent:
16.80 ÷ 65 percent = selling price.

```
          25.84
0.65 / 1,680.00
        1 30
          380
          325
           55 0
           52 0
            3 00
            2 60
              40
```

Short ribs: 7 pounds (3.2 kilograms)
Selling price: 59 cents per pound (0.5 kilogram)
Selling price: 0.59 x 7 = 4.13

Subtract \$4.13 from \$25.85 = \$21.72
Remainder of the rib roast must bring \$21.72.
Add 7 pounds (3.2 kilograms) short ribs and 2 pounds (0.9 kilograms) for trim and waste = 9 pounds (4.1 kilograms)
Subtract 9 pounds (4.1 kilograms) from 28 pounds (12.6 kilograms) = 19 pounds (8.6 kilograms)
\$21.72 ÷ 19 pounds (8.6 kilograms) = selling price per pound (0.5 kilogram)

$$\begin{array}{r} 1.14 \\ 19\overline{)21.72} \\ \underline{19} \\ 27 \\ \underline{19} \\ 82 \\ \underline{76} \\ 6 \end{array}$$

Results:

Cost	\$16.80
Selling price per pound (0.5 kilogram) for rib roast	1.14
Total selling price	25.85
Profit	9.05

Determining Percent of Gross Profit

The percent of gross profit is determined as follows:

$$\frac{\text{Gross profit}}{\text{Total selling price}} = \text{Percent of gross profit}$$

Determining Percent of Cut

Two forms are used to determine the percent of a cut to the total unit weight.

1. Divide the total unit weight into 100 for the key number.

$$\frac{\text{One-hundred}}{\text{Total unit weight}} = \text{key number}$$

$$\begin{array}{r} 1.21 \\ 82.5\overline{)100.000} \\ \underline{82\,5} \\ 17\,5\,0 \\ \underline{16\,5\,0} \\ 1\,0\,00 \\ \underline{8\,25} \\ 1\,75 \end{array}$$

Key number × weight of cut = percent of cut to total weight

34.4375 × 1.21 = 41.669375 or 41.67 percent

2. Divide the total unit weight into the weight of the cut to get the percent of cut.

$$\frac{\text{Weight of cut}}{\text{Total unit weight}} = \text{Percent of cut to total weight}$$

$$\begin{array}{r} 0.4174 \text{ or } 41.74 \text{ percent} \\ 82.5\overline{)34.43750} \\ \underline{33\,00} \\ 1\,437 \\ \underline{825} \\ 6125 \\ \underline{5775} \\ 3500 \\ \underline{3300} \\ 200 \end{array}$$

Note: The 0.07 percent difference in answers is due to rounding the key number.

UNIT B—APPLIED ARITHMETIC

TOPIC 8—DETERMINING SELLING PRICE

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The key number is determined by dividing 100 by the _1_ of the item. 1. ________

2. The key number multiplied by the weight of the cut equals _2_ of cut to total weight. 2. ________

3. The weight of the cut _3_ by the total weight of the item equals the percent of cut. 3. ________

4. The percent of gross profit is determined by _4_ gross profit by the selling price. 4. ________

5. The percent of cut to total weight can be calculated by dividing the _5_ of cut by the total unit weight. 5. ________

UNIT B—APPLIED ARITHMETIC

TOPIC 9—USE OF THE HAND CALCULATOR

This topic, "Use of the Hand Calculator," is planned to provide answers to the following questions:

- **In what kind of mathematical figuring will a meatcutter use the hand calculator?**
- **What are the four major uses the meatcutter will have for a calculator?**

NOTE: All students must have access to a calculator.

In the last 20 to 30 years, great advancements have occurred in the development of calculators so that they now vary from the hand model to the larger sizes that perform multiple operations.

As the sizes of calculators vary, so do their uses, which range from simple addition and subtraction problems to the complex mathematical formulas required for space travel.

Meatcutters' Use of the Calculator

The main operations of the calculator the meatcutter uses are addition, subtraction, multiplication, and division. These operations are applied to mathematical problems of merchandising and to figuring profits, prices, and inventories.

The calculator can be a great assistance to the person who has learned to apply the different rules of addition, subtraction, multiplication, and division, but only if this person masters the use of the calculator. Calculators are only as accurate as the persons who use them.

The methods of operating calculators are fairly standard, although each brand may vary. If the operation of one kind is mastered, the change to another will be easy.

Buying a Calculator

When buying a calculator, the meatcutter should be sure to have the salesclerk explain how to use the machine before purchasing it. All machines come with an operating brochure. Read it and ask any questions that come to mind.

The only operations of concern in this topic are adding, subtracting, multiplying, and dividing, and the application of these processes to problems unique to the meatcutting industry. This does not mean that some students will not do more, but most of the figuring will be in these areas.

The calculator will have no value unless the student learns the formulas for figuring inventory, pricing, and so forth.

More information may be obtained from: Casio, Inc., 11255 Woodruff Avenue, Downey, CA 90241 (Telephone 213-923-4564) or Executive Office, 15 Gardner Road, Fairfield, NJ 07006 (Telephone 201-575-7400).

UNIT B—APPLIED ARITHMETIC

TOPIC 9—USE OF HAND CALCULATOR

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. 459 × 63 = 1. ________

2. 7.64 × 5.1 = 2. ________

3. 6.251 × 0.045 = 3. ________

4. 4,683 ÷ 0.268 = 4. ________

5. 6,965 ÷ 34 = 5. ________

6. 76.3 × 437 = 6. ________

7. 0.0278 ÷ 0.00692 = 7. ________

8. 3,845 × 2,076 = 8. ________

9. 25,867 ÷ 7.335 = 9. ________

10. 7,959 × 4.50 = 10. ________

UNIT C TOOLS AND EQUIPMENT

TOPIC 1—HAND TOOLS

This topic, "Hand Tools," is planned to provide answers to the following questions:

- **Why should the meatcutter use and maintain hand tools with great care?**
- **What are the basic hand tools used in meatcutting?**
- **What safety practices should be observed when hand tools are used?**

Knives, the working tools of the meatcutter, should be of the best quality. Apprentice meatcutters will be judged in part by the way they use their tools and the condition in which the tools are maintained.

Basic Tools

Basic hand tools that may be used in the meatcutting trade are the 6-inch (15.2-centimetre) boning knife; the steak knife; the chop knife; the cleaver (essential if power equipment is not available); the 12-inch (30.5-centimetre) or 14-inch (35.6-centimetre) steel; and the stringer or needle.

Boning Knives

Three types of boning knives are used in the meatcutting trade: a boning knife with a stiff blade that is ⅞ inch (2.1 centimetres) wide, a scimitar boning knife, and a narrow boning knife (Fig. C-1). Boning knives can be bought in lengths of 5 inches (12.7 centimetres), 6 inches (15.2 centimetres), and 8 inches (20.3 centimetres). The 6-inch (15.2-centimetre) knife is the most popular among journey-level workers. Not all meatcutters use the same type of knife for a particular cutting task. Each meatcutter should use the knife that does the best job for him or her. Boning knives should be kept in the knife sheath for convenience and safety (Fig. C-1). The boning hook may be used in combination with the boning knife to hold the meat securely (Fig. C-1). Steak and breaking knives come in 10-inch (25.4-centimetre), 12-inch (30.5-centimetre), and 14-inch (35.6-centimetre) sizes; and in two types, the straight-blade knife and the scimitar steak knife (Fig. C-2). The straight knife is used for cutting chops, while the scimitar steak knife is preferred for cutting steaks or for breaking beef.

A steel is used to dress the blade of a knife. The steel comes in several sizes and in lengths of 12 and 14 inches (30.5 and 35.6 centimetres), both of which are popular (Fig. C-3).

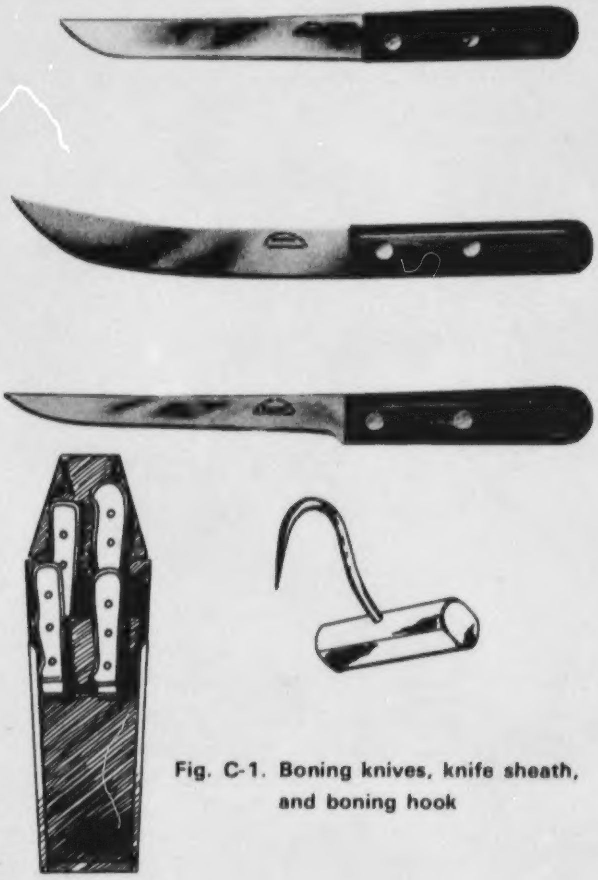


Fig. C-1. Boning knives, knife sheath, and boning hook

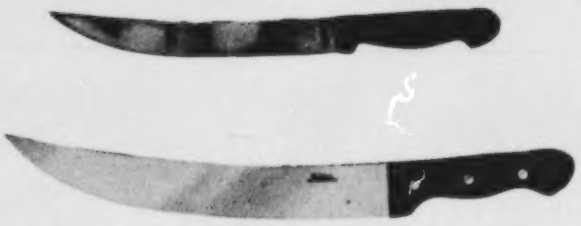


Fig. C-2. Straight-blade knife and scimitar steak knife

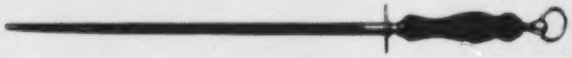


Fig. C-3. Butcher's steel, used to dress knives

Cleavers

Several different sizes and shapes of cleavers are available (Fig. C-4). The cleaver is not absolutely necessary in the meatcutting trade because the table power saw has replaced it. The power saw actually does a better job, because the cleaver splinters the bone, thereby interfering with the wrapping of packaged meats in a self-service market.

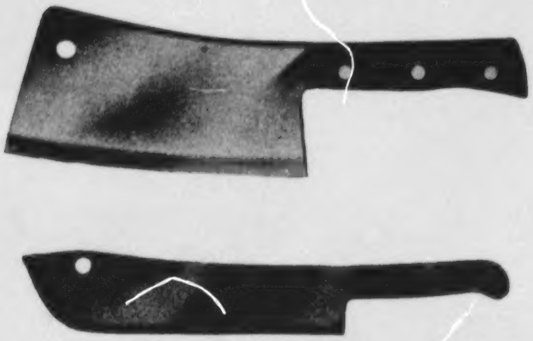


Fig. C-4. All-purpose cleaver and pork and lamb cleaver

Stringer or Needle

The stringer or needle is used in rolling and tying beef or any other type of boneless meat (Fig. C-5). The meatcutter should take special care of this important tool. In particular, the point of the needle should be kept sharp at all times. As apprentices become skilled in the trade, they will add other tools as they are needed.

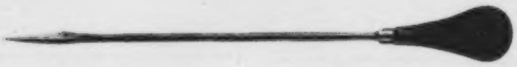


Fig. C-5. Stringer or needle, used on boneless meats

Handsaw

The handsaw is used very little today; however, before the power saw was developed, the handsaw was used extensively. To prevent the handsaw from jumping and thus causing an injury, the meatcutter should place the index finger or thumb of the free hand over the top of the blade, making sure that the grip is firm. Full-length strokes should be used to prevent the saw from sticking and jerking.

Safety Procedures and Tool Care

Safety is a vital consideration in the use of hand tools.

Knives

Meatcutters should keep in mind the following safety procedures regarding the use of knives:

1. Protect your investment in knives by taking care of them yourself or by having them sharpened by a competent professional. Some markets provide a contract service for sharpening knives; others give time on the job to the meatcutter to sharpen them. Whichever method is used, never let a "curbstone" knife grinder work on them.
2. Use the oilstone to work out a nick in the blade as soon as possible. Keeping knives in good shape is easier than letting them deteriorate.
3. Return knives to the rack after each use. Knives that are stuck in the block may become damaged, or they may injure someone who strikes them accidentally.
4. Wash knives and cleavers as often as necessary to keep blood and grease from the handles. Wash the tools one at a time in a shallow pan, using warm water and detergent, rinsing in warm water, and wiping dry by rubbing the blade against a cloth placed on the block. Then put a light coat of mineral oil on the blade. Do not soak knives or other tools for a long period because the wooden handles will expand, causing the rivets to become loose and the handles to shrink.
5. Keep knife handles in good repair so that you can get a good grip on them. Boning knives should have a simple guard on the side of the handle. This guard is a small curved piece of

steel riveted to the handle. Cracked or badly worn handles should be replaced for sanitation and safety. The handles should be kept clean at all times. A greasy handle is as dangerous as a dull knife.

6. Do not lay a knife on the block, and do not lay meat on a knife.
7. Do not leave a knife in a drawer or on a shelf.
8. Use a knife holster when working in a shop where a great deal of boning is being done or where most of the time is spent in breaking meat. Holsters, which are worn by packinghouse workers and are made of aluminum, keep the knives handy and protected.
9. Do not pass a knife to another person. Lay it on a surface so the other person can take it.
10. Do not try to catch a knife that drops.
11. Use each knife for the purpose for which it is intended. Never use a knife to cut boxes, rope, or wood.

Handsaw

The handsaw blade should be kept clean and sharp. The blade should be resharpened or replaced as it gets dull. All the slots and recesses in the handle and frame should be cleaned frequently.

Cleavers

The cleaver is best sharpened on a power grinder. Safety glasses should be worn while a power grinder is being used. Better yet, the supplier should sharpen the cleaver. A cleaver should never be used to open boxes or crates or to hammer on anything. After a cleaver is used, no slivers of bone should be left in the meat.

Equipment

Boning hooks, larding needles, or other pieces of equipment that have sharp edges or points should be kept in separate, labeled boxes. The steel should always be kept clean, and the knives should be wiped clean before they are put on the steel.

Each journey-level worker and apprentice should have a complete set of tools for his or her own use. The apprentice meatcutter will find that taking the extra time to maintain his or her tools in good condition pays off in the long run. Dull knives and cleavers and other tools that are poorly maintained waste time and produce inferior work.

NOTE: The instructor may wish to demonstrate the correct method of sharpening a knife on an oilstone as well as the correct use of the steel to dress the blade. The steel should not be used as a sharpening device.

UNIT C—TOOLS AND EQUIPMENT

TOPIC 1—HAND TOOLS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The basic hand tools used by the meatcutter are the _1_ -inch boning knife, the steak knife, the chop knife, the cleaver, the _2_ -inch or _3_ -inch steel, and the stringer or _4_ .

   1. ________
   2. ________
   3. ________
   4. ________

2. The three types of boning knives commonly used by meatcutters are the boning knife with a _5_ blade, the _6_ boning knife, and the _7_ boning knife.

   5. ________
   6. ________
   7. ________

3. The _8_ -inch boning knife is the most popular among journey-level meatcutters.

   8. ________

4. Steak and breaking knives come in two types, the _9_ blade knife and the _10_ steak knife.

   9. ________
   10. ________

5. For the most part the _11_ power saw has replaced the cleaver in the meatcutting trade.

   11. ________

6. The stringer or _12_ is used in rolling and tying beef or any other type of _13_ meat.

   12. ________
   13. ________

7. Before the _14_ _15_ was developed, the handsaw was used extensively.

   14. ________
   15. ________

8. The best way to work out a nick in the blade of a knife is to use an _16_ .

   16. ________

9. Knives should be washed one at a time in a shallow pan containing warm water and _17_ ; then, after being rinsed and dried, the blade of each knife should be given a light coat of _18_ oil.

   17. ________
   18. ________

10. When sharpening a cleaver on a power _19_ , the meatcutter should be sure to wear _20_ glasses.

   19. ________
   20. ________

UNIT C—TOOLS AND EQUIPMENT

TOPIC 2—POWER TOOLS

This topic, "Power Tools," is planned to provide answers to the following questions:

- **Why are power tools used by meatcutters?**
- **What safety practices should the meatcutter observe when using power tools?**
- **How should power tools be cleaned and maintained?**

Types of Power Tools

Several electrically powered machines are available for use by the meatcutter. The table power saw, steak tenderizer, and meat grinder have been standard equipment in meat departments for some time. More recent introductions, which got their start in the jobbing phase of the industry, are the mixers, patty machines, and hand power saws.

Table Power Saws

The table power saw consists of a one-piece bandsaw blade that revolves on two wheels and a reciprocating support or cutting table, part of which slides back and forth as it supports the meat to be cut (Fig. C-6).

Safety procedures. The operator should always observe caution with a power saw. Even before the power saw is turned on, the apprentice meatcutter should be sure that he or she understands how to use it. Most important of all, the meatcutter should keep fingers away from the blade and should never wear gloves while operating the power saw. (The edges of the gloves can get caught by the blade.) Finally, while operating a power saw or any other power equipment, the operator should not try to carry on a conversation.

General Industry Safety Orders, issued by the California State Division of Industrial Safety, calls for the use of a guard to cover and to protect the exposed portion of the saw blade between the guide rolls and the housing of the upper wheel. Each time an operator uses the saw, he or she should readjust the guard and the stabilizer (which supports the guard and moves in unison with it) so that the guard will be in the lowest position practical for the size of the piece of meat to be cut. This procedure will ensure maximum protection in front of the cutting edge of the saw blade (Fig. C-7).

The power to the saw should be shut off as soon as the sawing is completed. Even when the power has been turned off, the blade will continue to run for a short time. Because this movement is difficult to see and hear, anyone starting to readjust the guard and stabilizer should make sure that the blade is not in motion. Learning to use the power saw is not difficult. Less time is needed to master its use than to learn to cut meat with a knife and handsaw. When roasts, steaks, and fish are cut, the thickness gauge provided on the saw should be used (Fig. C-8). If possible, meat and fish should be trimmed before cutting.

When cutting meat on a power saw, the operator should never remove the piece of meat by crossing his or her hand in front of the cutting edge of the saw blade. The operator must always remove the meat by reaching for the cut piece from behind the dull side of the blade. The meat should then be placed to one side. The white film that collects on the meat from power saw cutting includes bone dust and fat. The film can be removed if the cuts of meat are scraped with a plastic, metal, or automatic scraper.

When cutting meat, the operator should exert just enough pressure to hold the meat in position against the guard. Forcing the meat causes the cuts and slices to come out unevenly. Whether the meatcutter stands directly in front of the table or to one side, he or she should remember that the safest position is the best position.

Cleaning and maintenance. If proper care is taken of the power saw and it is lubricated regularly with lubricants recommended by the manufacturer, the saw will give long and efficient service. When cleaning the saw, the operator should take care to prevent water from getting into the bearings. A whisk broom and a damp, hot cloth are sufficient for the cleaning of the area around the bearings. All moving parts should be well lubricated, and the saw blades should be kept sharp. A dull blade increases the cutting time and cuts the meat unevenly. Since cleanliness is absolutely necessary for proper sanitation, the power saw should be cleaned at the end of every shift. It should never be cleaned, oiled, or adjusted, however, while it is running. The recommended practice is to disconnect the power before cleaning or adjusting the saw by pulling the cord from the wall when such a cord is provided or by turning off the main power switch.

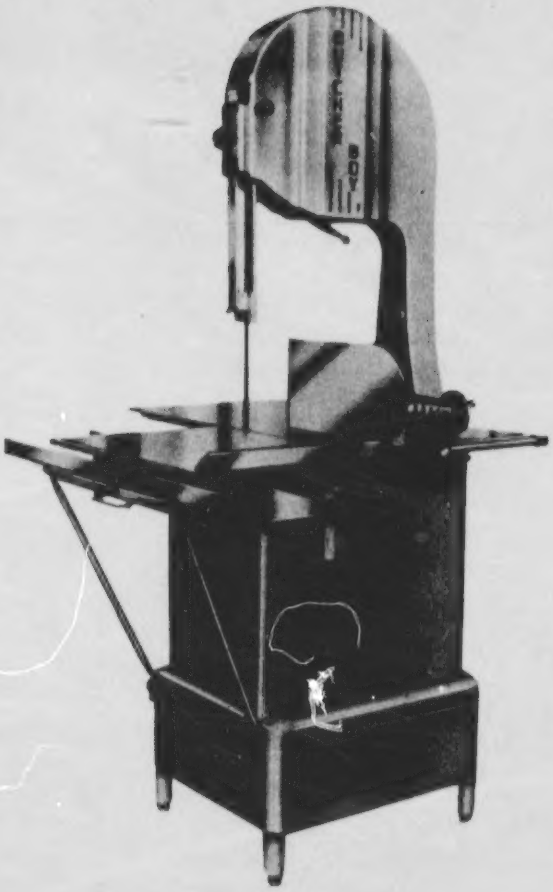


Fig. C-6. Table power saw

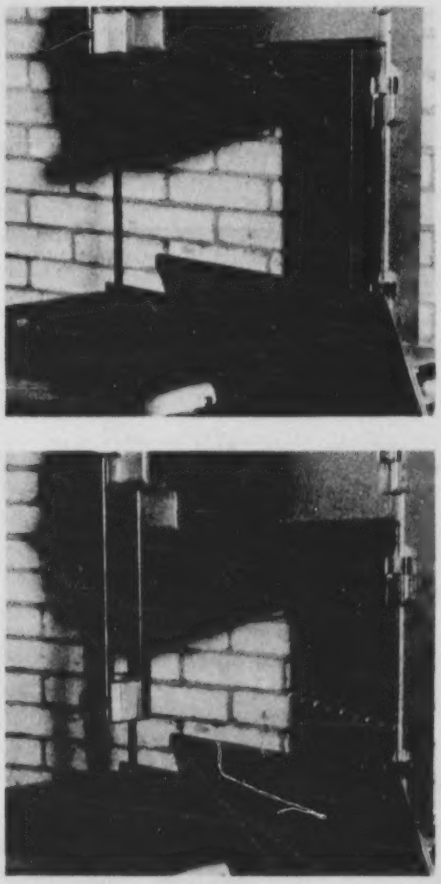


Fig. C-7. Incorrect (above) and correct (below) positions of guard and stabilizer

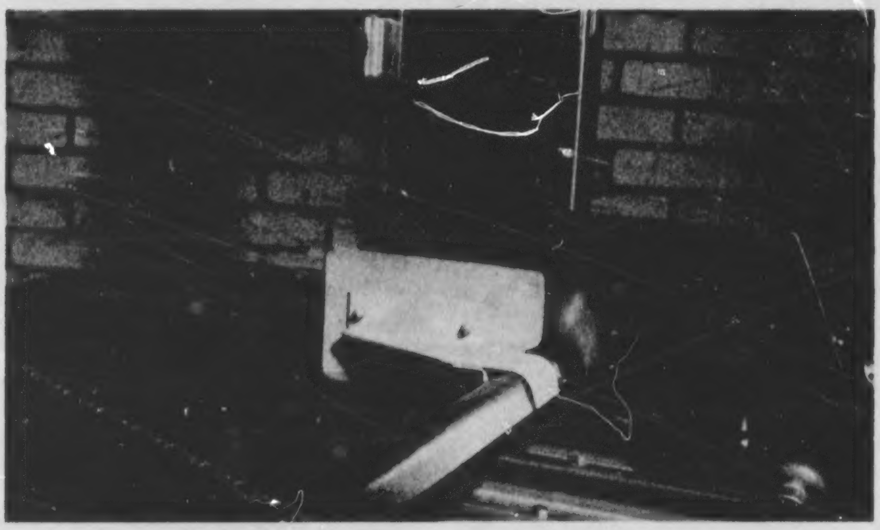


Fig. C-8. Thickness gauge, used in cutting roasts, steaks, and fish

Today, most meatcutters clean their saws with the hot water pressure gun. This method may cause some damage, but the time saved in labor will more than pay for the repairs.

Steak Tenderizers

The steak tenderizer is also known as a cubing machine. Meat is fed in at the top of the machine and is pushed through two sets of revolving knives. The tenderizer is designed to cut partially through the meat to break down the connective tissue in the tougher cuts and thus make them more tender and more easy to prepare. In addition, the tenderizer can be used to convert trimmings and small pieces of meat into cube steaks.

Safety factors. Of primary importance from the standpoint of safety is the installation of an extended safety chute or other type feed opening that is built to prevent the operator's hand from entering the revolving spiked rolls. Different manufacturers have different answers for this problem (Fig. C-9).

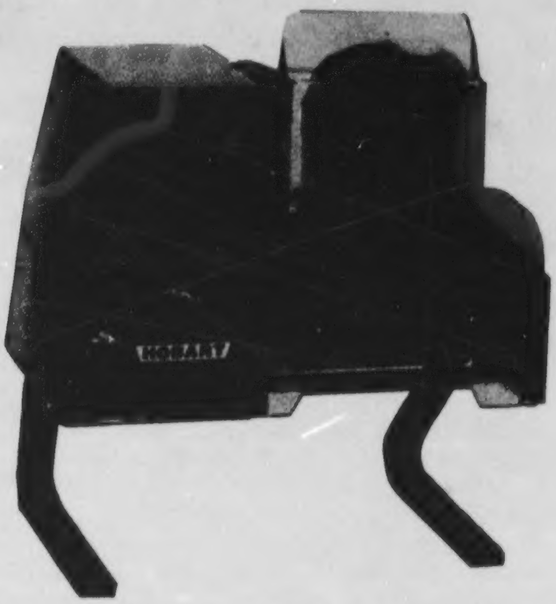


Fig. C-9. Steak tenderizer with safety feed chute

General Industry Safety Orders requires that the feed opening be extended so that a person cannot touch the revolving blade of the tenderizer. This requirement may be accomplished by having the guard installed so that the opening is far enough above the blades and narrow enough to prevent a person from getting his or her hand into the opening.

A second safety feature built into many of these machines is an interlock or electrical contact button. The button is placed so that it can be depressed only when the cover is on. Because the machine will not run unless this button is depressed, the machine can be turned on only when the cover is closed. The operator's fingers are thereby protected.

Cleaning. Cleaning a tenderizer presents particular hazards. If the machine is cleaned daily, the job is much easier. The cutter roll assembly and roll unit should be removed and held under cold water. If time permits, these parts can then be soaked in hot water. Putting them under hot water first is not recommended because this procedure tends to "cook" the meat and make it harder to remove.

A hose connection may be used for the washing process, together with a bristle brush or whisk broom. The use of soap or a wire brush is not advisable, because the first meat going through the machine may pick up a soapy flavor or a wire particle. Manufacturers include a metal cleaning fork with each purchase of a steak tenderizer. Using tools while the machine is in operation is a dangerous practice unless the machine is first disassembled and one roll at a time is replaced and cleaned. The danger of a hand being drawn into the assembly is minimized, but the possibility remains that the operator's hand may come into contact with the sharp spiked ends of the knives. However, if the tenderizer has been cleaned daily with water, the use of the cleaning fork will probably not be required very often.

Other sources of accidents are improper cleaning or failure to check the machine for proper working order before using it. The end bushings should be seated correctly, and no foreign matter should be left in the cutter. Hand knives should be kept at a safe distance from the machine. Before beginning to operate the tenderizer, the meatcutter should have the steaks ready. The machine should not be left running while the steaks are being prepared for tenderizing.

Grinders

General Industry Safety Orders requires that meat grinders or choppers must be constructed, installed, or guarded so that the operator's fingers cannot come into contact with the worm. Among the protections that are acceptable are (1) a mechanical method of feeding meat into the machine in such a way that the operator cannot touch the worm during the operation; (2) a small enough opening on the neck leading to the cylinder so that the operator cannot reach down into the worm (Fig. C-10); and (3) a grating of parallel bars, known as a guard, that is permanently attached to the hopper just above the feeding hole so that the hands cannot get past the bars and into the opening (Fig. C-11).

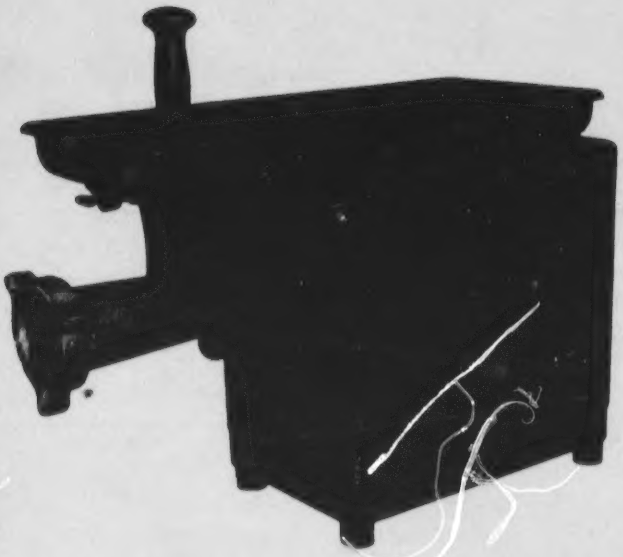


Fig. C-10. Small food chopper with narrow neck opening

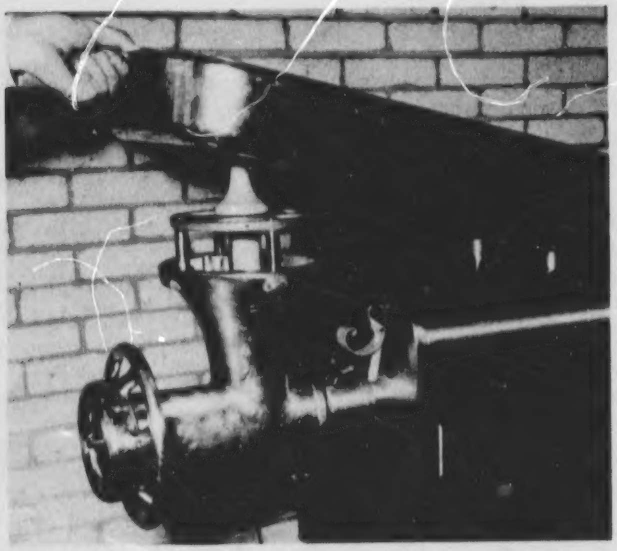


Fig. C-11. Food chopper with guard attached to cylinder head

Other safety measures include the provision of a pusher for each grinder, to be used when necessary for pushing small pieces of meat into the feeding hole. However, the use of a pusher does not remove the need for the guards. Some meat grinders are so constructed that the electric power to the motor is cut off automatically by means of interlocks whenever the feed pan or grinder head is removed for cleaning (Fig. C-12).

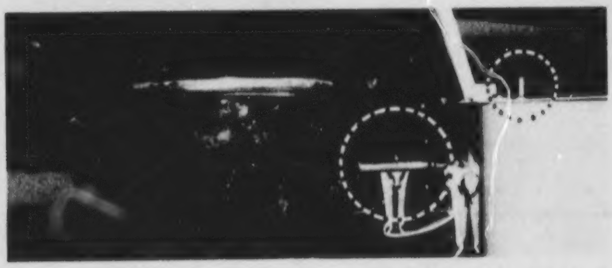


Fig. C-12. Food chopper with two safety interlocks (circled)

Mixers

Food mixers, which have been used by jobbers and sausage producers for some time, are just now coming into use in retail markets. Their purpose is to ensure equal distribution of fat throughout the ground meat or sausage (Fig. C-13). The chief hazard encountered in the use of mixers arises from the operation of the mixing paddles in the bottom of the tub. To prevent injury with this machine, the State Division of Industrial Safety requires installation of an interlock switch similar to that on the tenderizer so that the paddles will operate only when the top is completely covered (Fig. C-14).

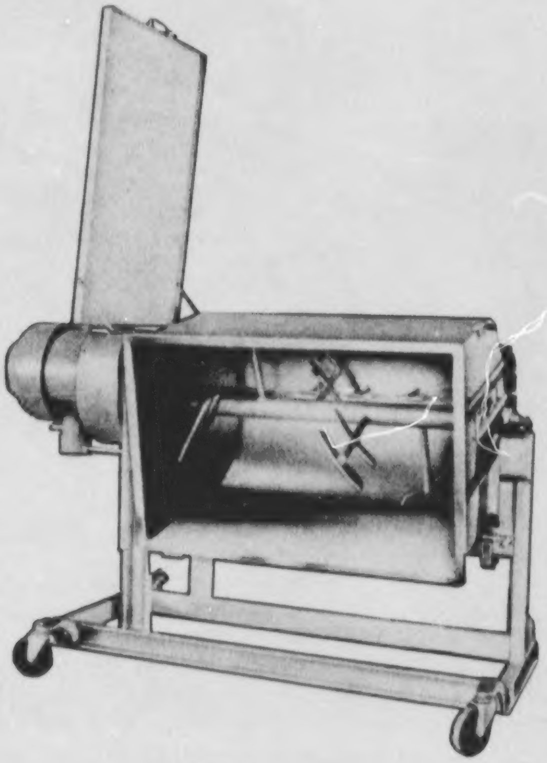


Fig. C-13. Food mixer, tilted to show paddles

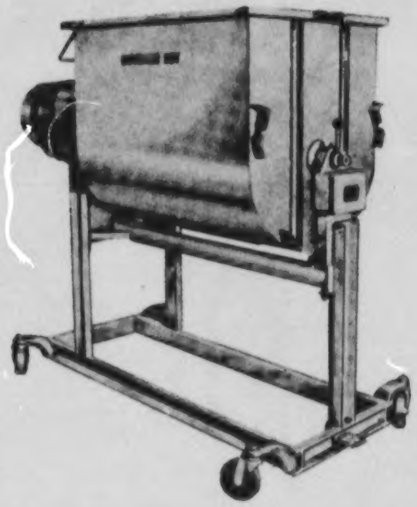


Fig. C-14. Food mixer with lid in closed position

Patty Machines

One of the popular machines in markets is the hamburger patty machine, which automatically forms ground beef or sausage into patties of the desired size, shape, and weight (Figs. C-15 and C-16). An added feature is the automatic feeding of backing paper with the patties. These machines may, however, be hazardous to those who fail to use them properly.

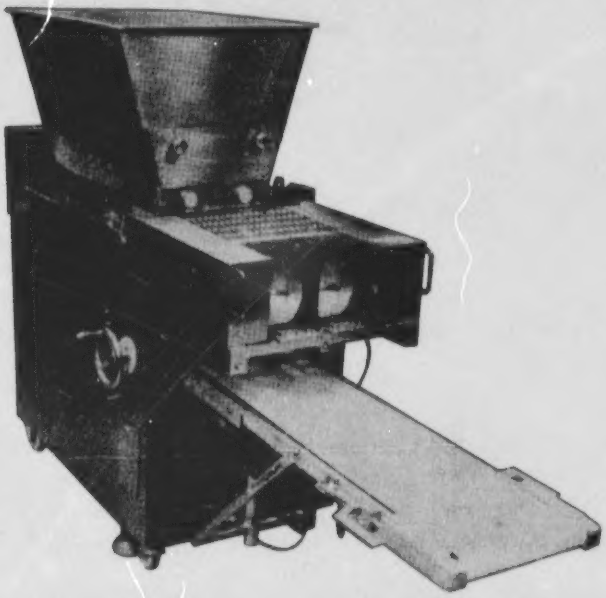


Fig. C-15. Hamburger patty machine

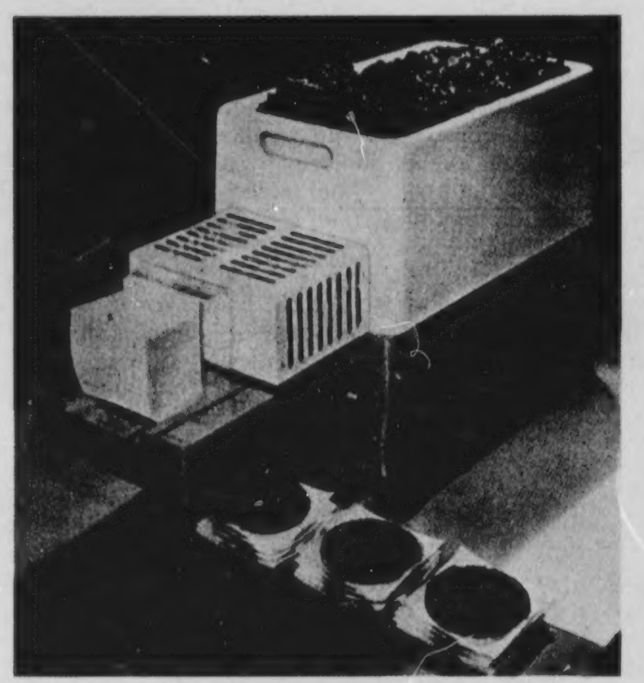


Fig. C-16. Exposed view of hamburger machine

In compliance with *General Industry Safety Orders,* guards must be provided at the feed opening and at the knockout assembly. Even so, injuries have been reported as occurring in both of these places. In these cases either no guards were provided or one of the guards was lifted to allow the operator to reach into the machine to flick off an accumulation of excess meat or to catch one of the patties in his or her hand. Some of these machines are built with a cover and an interlock that disconnects the power if the cover is raised or removed.

Power Handsaws

The power handsaw is used by meatcutters for breaking quarters into primal cuts (Fig. C-17). It works faster than a regular handsaw and can do large jobs that the average handsaw cannot do. The power handsaw is not, however, a replacement for the table model power saw; each has its particular uses.

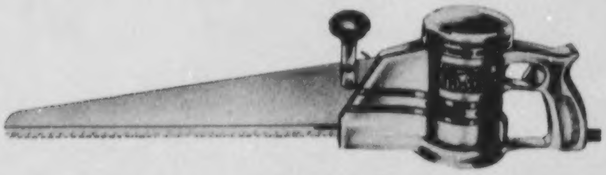


Fig. C-17. Power handsaw used to break quarters

Slicers

Slicers have long been used in meat markets, but they are no longer so necesary because luncheon meat now comes presliced. In the retail market, however, the slicer is still used for slicing slabs of bacon, salt pork, boneless ham, boneless roast turkey, turkey hams, barbecue turkey, and some cold meat items.

One of the most important safety rules to remember in using slicers is to keep the fingers and hands away from the slicer blade (Fig. C-18). A safety feed grip is provided for pushing meat to the blade. To clean the blade, the operator should use a towel wrapped around a large wooden skewer, not a towel wrapped around his or her hand.

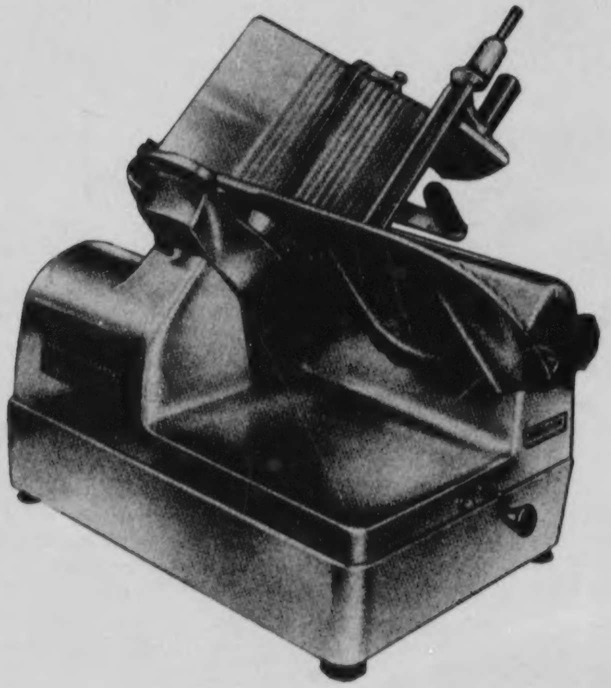


Fig. C-18. Meat slicer with guard in position

Material should not be allowed to accumulate around the electric slicing machine. Keeping this area clean and neat is important. If grease from the meat being sliced runs off the slicer, the grease should be wiped up immediately. After the machine has been sharpened, the thickness gauge should be closed and the blade cleaned.

Automatic Feed Grinder

The automatic feed attachment increases the output of the chopper or grinder (Fig. C-19).

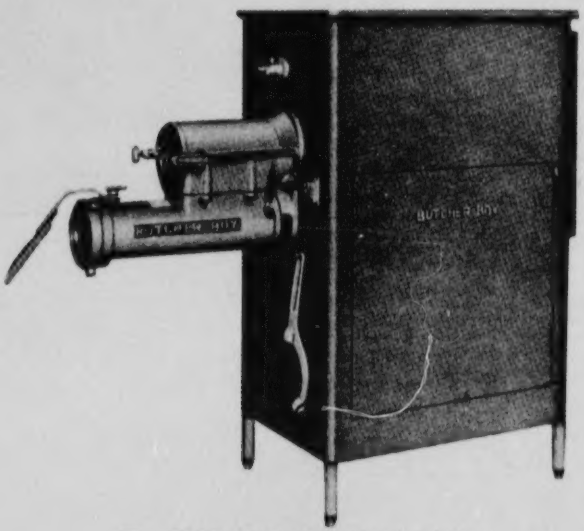


Fig. C-19. Automatic feed grinder

Dual Mixer Grinder

The dual mixer grinder incorporates grinding and mixing into one operation (Fig. C-20).

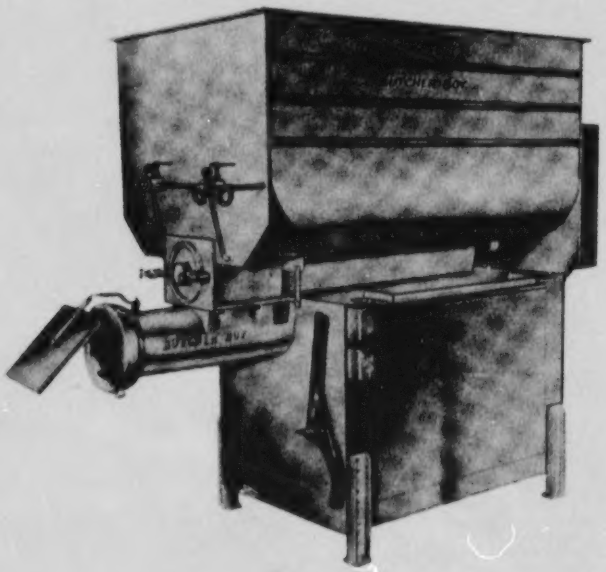
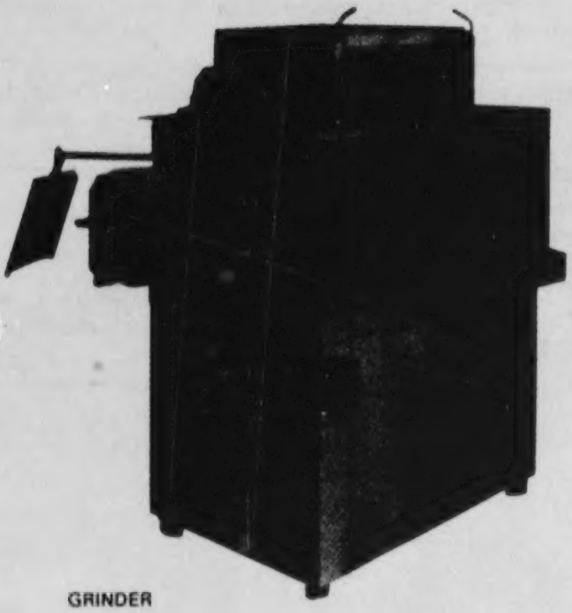


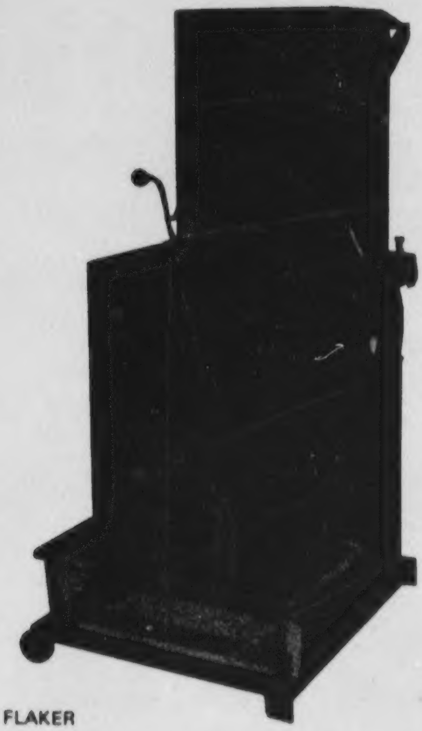
Fig. C-20. Dual mixer grinder

Frozen Meat Block Grinder and Frozen Meat Flaker

The frozen meat block grinder and flaker fulfill the same purpose. They break the solid frozen blocks of lean grinding meat, without thawing, into flaked meat which can then be run through the regular grinder (Fig. C-21).



GRINDER



FLAKER

Fig. C-21. Frozen meat block grinder and flaker

Fat Percentage Measuring Kit

The fat percentage measuring kit is simple, easy to operate, accurate, and portable. This kit helps the meatcutter comply with the regulations controlling the fat content of ground meat (Fig. C-22).

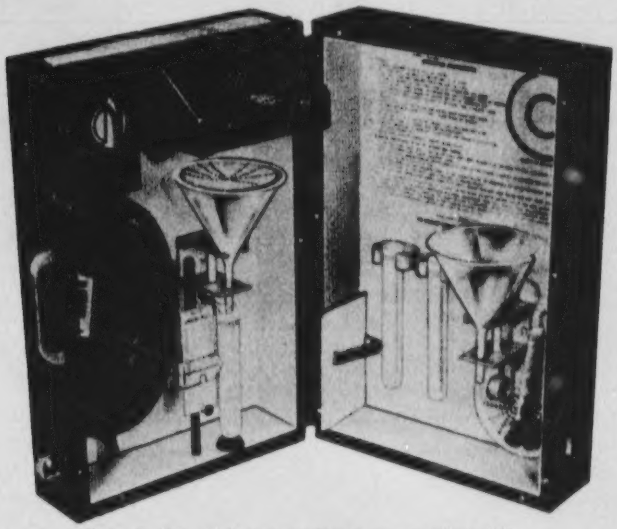


Fig. C-22. Fat percentage measuring kit

Primal Cut Tenderizer

The primal cut can be tenderized in one piece with the bone in. The needles of the primal cut tenderizer penetrate until they are stopped by the bone; the rest of the needles continue until full penetration has been accomplished (Fig. C-23).

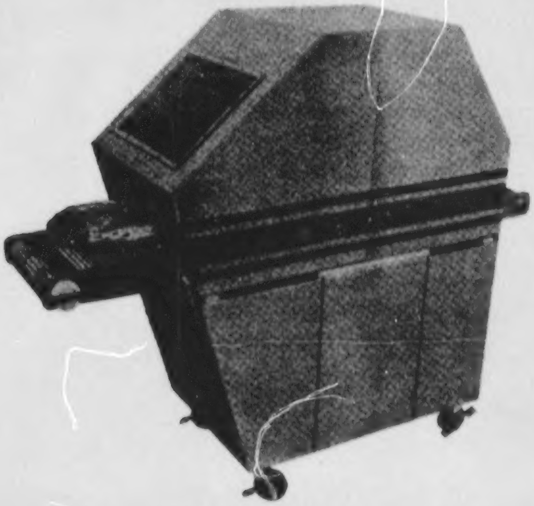


Fig. C-23. Primal cut tenderizer

Use of Switches

Two different types of switches are used in connection with various machines found in the retail market. One is the master switch, which is independent of the machine and is located elsewhere than on the machine itself. This master or disconnect switch should have a means of locking in the "off" position, and it should be locked in the "off" position whenever the machine is undergoing repair, maintenance, or cleaning. This locking is particularly important if the electric cord connected to the machine cannot be pulled from the socket.

The second type of switch is the operating switch on the machine itself. *General Industry Safety Orders* calls for locating these switches so that they are not likely to operate from accidental contact with objects or parts of the body. To comply with this order, market owners have implemented one or more of the following changes: (1) attach on each side of the switch a couple of "ears," with a hole in each, to permit insertion of a pin through the holes to hold the switch in an "off" position; (2) install a protruding fixed rod just beneath the switch to help prevent the switch from being accidentally pushed into the "on" position; (3) install a pull-type switch; and (4) install a recessed switch.

NOTE: The instructor may wish to have representatives of equipment companies come to the classroom. In addition, the apprentices may visit equipment manufacturing plants to see films or receive instruction in the use and care of equipment.

UNIT C—TOOLS AND EQUIPMENT

TOPIC 2—POWER TOOLS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The table power saw consists of a one-piece 1 blade revolving on wheels and a reciprocating support or 2 table.
   1. ________
   2. ________

2. The *General Industry Safety Orders* calls for the use of a guard on the table power saw to cover and protect the exposed portion of the saw blade between the guide 3 and the 4 of the upper wheel.
   3. ________
   4. ________

3. When using the table power saw, the meatcutter should readjust the 5 and the 6 .
   5. ________
   6. ________

4. When using the table power saw, the meatcutter should never remove the meat being cut by crossing his or her hand in front of the 7 edge of the saw blade.
   7. ________

5. The operator of the table power saw must always remove cut meat by reaching for it from behind the 8 side of the blade.
   8. ________

6. When cleaning the table power saw, the operator should be careful to keep water out of the 9 ; a whisk broom and a 10 , hot cloth are sufficient to clean that area.
   9. ________
   10. ________

7. In addition to breaking down 11 tissue in tougher cuts of meat, the steak tenderizer can be used to convert trimmings and small pieces of meat into 12 steaks.
   11. ________
   12. ________

8. An additional safety feature built into many steak tenderizers is an 13 or electrical contact button.
   13. ________

9. *General Industry Safety Orders* requires that meat grinders be constructed, installed, or guarded so that the operator's fingers cannot come into contact with the 14 .
   14. ________

10. The two types of switches used for the various machines in the retail market are the operating switch on the machine itself and the master or 15 switch, which is separate from the machine.
    15. ________

UNIT C—TOOLS AND EQUIPMENT

TOPIC 3—REFRIGERATION EQUIPMENT

This topic, "Refrigeration Equipment," is planned to provide answers to the following questions:

- **What are the different types of refrigerated display cases?**
- **How do these cases operate?**
- **What precautions must be taken to ensure good operation of these cases?**
- **What precautions must be taken when walk-in boxes are used?**

Refrigeration equipment is essential to the operation of a retail meat business. Without this equipment the highly perishable meat would soon deteriorate. The average market has refrigeration equipment for (1) walk-in boxes and cutting rooms (storage); and (2) service and self-service cases (display). In addition, special storage rooms and display cases must be provided for frozen meats.

Display Cases

With the rise in popularity of the self-service market several years ago, the use of service cases has declined (Fig. C-24). These service cases are basically of three kinds: single-duty cases, which are used only for display of meats; double-duty cases, which provide both display space and storage area under the displays; and fish cases. The fish case relies primarily on crushed ice located under the display for the needed cold air. Cooling coils at the top of the case are used mainly to preserve the ice. The glass on these cases may be of single, double, or triple thickness.

Self-Service Cases

Self-service cases have either a glass partition or a solid partition in front of the display (Fig. C-25). The glass front has the advantage that it can be built up higher in front to prevent the excessive loss of cold air.

Method of cooling. Self-service cases are cooled by a continuously circulating column of cold air that originates under the display and moves up through the front of the case and out through louvers over the display. Inside the back of the case, a flue is provided that tends to draw the air down to a fan and through the coils, where it is recooled and sent back through the louvers.

Methods of defrosting. Three systems normally are used for defrosting these cases: gravity, electric, and hot-gas or reverse-cycle. The last two systems involve the introduction of warm air to speed the defrosting cycle. Because of this, some operators contend that these systems "cook" the meat slightly. However, they are much faster than the gravity system and thus cut down on the deterioration of meat.

The gravity system operates off a time clock, which is usually set to repeat the process two or three times each day. When the clock activates the process, the compressor stops operating; the fan, however, continues to send air through the system. Without the compressor operating, the temperature of the air that is traveling through the system gradually rises. The air defrosts the coils as it moves across them.

Also operating from a time clock is the electrical system. In this system the clock turns off the compressor and turns on an electric heat coil in front of the

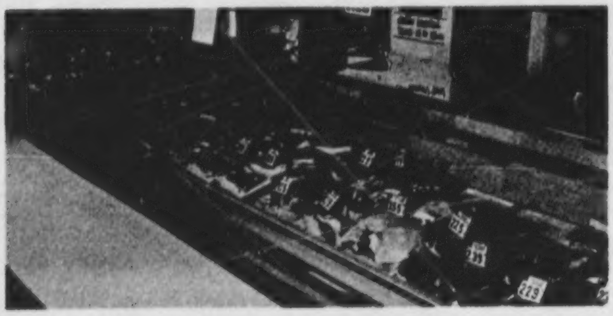


Fig. C-24. Service display case, well stocked with fresh meat

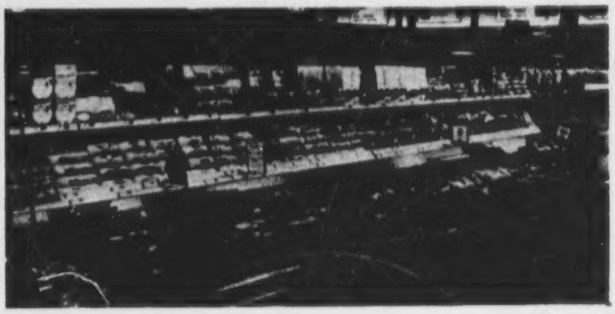


Fig. C-25. Self-service display case

compressor. This heated coil warms the air that is pushed through the system. The warm air in turn defrosts the freezing coils as it moves across them. Normally, only a single defrosting is needed each day.

The hot-gas or reverse-cycle system begins when the time clock trips a reverse valve on the compressor, introducing into the compressor the gas that has become heated from the compressing process. As this warm air moves through the system, the freezing coils are defrosted.

Either the electric or reverse-cycle system is used for frozen-food cases because the gravity defrost cycle is too slow. On the other hand, service cases use only the gravity system.

As with the service cases, both single-duty and double-duty self-service cases are built. In addition, three-deck self-service cases have been introduced (Fig. C-26). These are basically solid-front cases with three decks of refrigerated shelves. A fan forces air up the back and out through perforations behind each level of shelves. As with the single-shelf case, air is drawn back into the system through a flue in the front. However, cool air is sent out at a slower rate than in a single-shelf case to prevent its being pushed off the front.

Food handling. Frozen foods should be checked when they are received to be sure that they are in good condition. They should be put into the frozen-food case or storage freezer at once. If they are allowed to thaw, they will not refreeze properly in the frozen-food case. In both frozen-food and fresh-meat display cases, all products should be kept below the load line; otherwise, the movement of air will be interrupted.

Temperature. The temperature in the display cases should be checked several times a day. It should be noted that while the refrigeration unit is on its defrost cycle, the temperature will go up. Before a technician is called, therefore, the unit should be checked to make sure that it is actually in need of repair. Also good to know is how to operate the turn-on switch for the compressor. Some cases are equipped with automatic switches, but others must be operated manually. If, however, the compressor stops and the switch fails to reactivate it, a qualified service person should be called immediately.

Fig. C-26. Three-deck self-service case

Lighting. Correct lighting of the display cases is important. The overhead lights in the market should not be lowered so that they are too close to the display cases because the temperature in the cases will rise. In addition, meat placed too close to the lights within the display case will fade. The only light tubes that should be used near the meat case are those marked "soft white" or "de luxe cool white." These tubes, which were developed specifically for the display case, have the least harmful effect on meat in the case. They also make the meat look attractive.

Lighting defects can cause the meat to darken. The faulty contact of a fluorescent light with a lamp socket can permit a small electric discharge that produces ozone, which can darken meat. Fortunately, the arcing condition generally can be heard, located quickly, and corrected. Also, the sweet, acrid odor that is common to ozone can be detected in a relatively short time. The same condition may exist if the contact between the brushes of an electric motor and the commutator is poor. This condition can be corrected by a competent electrician or motor repair person.

Special Problems

One problem that may develop in the meat display area is the accumulation of carbon monoxide. In those areas where natural gas is available at low cost, many of the stores that use it experience a darkening of red meats. Carbon monoxide, a product of combustion, may be the offender. Direct-fired gas heaters and oil stoves must be vented to the outside of the building so that carbon monoxide, which is always present when gas or oil is burned, does not remain in the building.

Self-service cases must be protected from the heat of outside lights and from fans or drafts because they will upset the cycle of cool air flowing through the cases. All refrigerated fixtures must be installed in a level position. Failure to do so will result in the improper drainage from the drip trough under the coils, the holding of water or other spilled liquids in the underpart of the fixture, and less efficient operation of the refrigeration coils.

Because the refrigeration condensing unit needs free circulation of air, all papers, debris, and stored merchandise should be kept at a distance so that nothing will interfere with the air flow. For all practical purposes the air-cooled condenser may be compared with the radiator of an automobile. Vast quantities of air must be drawn through the condenser to accomplish its purpose. Therefore, the condenser should be kept free of dirt or dust particles that prevent the proper circulation of air.

Storage Boxes

Most of the walk-in boxes now in use are the built-in type, although metal and wooden boxes also are available. In some markets the bloom box is part of the cooler. In other cases it is a separate box and is held at a slightly different temperature from that of the cooler.

The primary coolant for display equipment and storage boxes is refrigerant Freon-12. In some meat markets the more expensive refrigerant Freon-22 is used as the coolant in the refrigeration equipment.

The Division of Occupational Safety and Health's *General Industry Safety Orders* states that walk-in boxes must have the following safety features:

1. At least one door of the box must be provided with a lock that can be opened from the inside even when the outside is padlocked. If the box is not provided with this type of lock, then the padlock must be made unusable, or an electrically operated audible and visual signal system must be installed so anyone locked in the box may summon help.
2. The storage box must have a light that cannot be turned off on the outside.
3. A firefighter's-type ax must be located inside the box near the door (Fig. C-27). In freezer boxes a crowbar or pinch bar is more suitable than an ax because frost forms more quickly in this type of box.

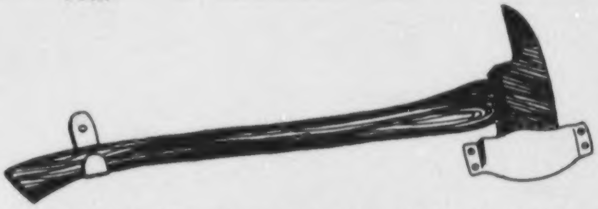


Fig. C-27. Firefighter's ax, to be placed inside walk-in box

In addition, the Division of Industrial Safety advises persons required to remain in a walk-in box for any period of time, such as for cleaning, to wear goggles or otherwise shield themselves from the rays of the ultraviolet lights used in boxes of this kind.

Recommended Temperatures

Temperatures recommended for the walk-in box are 32° to 36° F. (0° to 2.2° C); for the cutting room, 55° to 60° F. (12.7° to 15.6° C); for the display cases, 30° F. (-1.1° C); and for the bloom box, 33° to 36° F. (0.6° to 2.2° C).

UNIT C—TOOLS AND EQUIPMENT

TOPIC 3—REFRIGERATION EQUIPMENT

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Normally, a meat department has refrigeration equipment to take care of _1_ facilities and _2_ facilities.	1. ________ 2. ________
2. Service cases used in meat departments include _3_ cases, _4_ cases, and _5_ cases.	3. ________ 4. ________ 5. ________
3. Self-service cases have either a _6_ or _7_ partition in front of the display.	6. ________ 7. ________
4. These cases are cooled by means of a circulating column of cold air that comes from _8_ the display.	8. ________
5. The systems normally used for defrosting these cases are the _9_, _10_, and hot-gas or _11_-cycle systems.	9. ________ 10. ________ 11. ________
6. For defrosting, frozen-food cases use the _12_ system or the _13_-cycle system; service cases use only the _14_ system.	12. ________ 13. ________ 14. ________
7. In frozen-food and fresh-meat display cases, products should always be kept below the _15_ line.	15. ________
8. The faulty contact of a fluorescent light with a lamp socket results in the production of _16_, which can _17_ meat.	16. ________ 17. ________
9. The primary coolant for display equipment and storage boxes is refrigerant _18_.	18. ________
10. *General Industry Safety Orders* requires that for walk-in boxes a firefighter's-type _19_ must be located inside the box; also, workers who must remain in the box for some time should wear _20_ or otherwise shield themselves from ultraviolet rays.	19. ________ 20. ________

UNIT D WEIGHING, PACKAGING, AND LABELING

TOPIC 1—USE AND CARE OF THE MEAT SCALE

This topic, "Use and Care of the Meat Scale," is planned to provide answers to the following questions:

- **Why are accurate meat scales important?**
- **How should a meat scale be read correctly?**
- **How should meat scales be cared for?**

Importance of Accurate Weighing

Weighing meat is an important part of the meatcutter's work. The meatcutter must weigh the meat when it is received from the wholesaler. Then he or she must weigh each cut before it is sold to the customer. The necessity for accuracy is readily apparent. If too much meat is given to the customer, the market loses money; if too little meat is given, the customer loses, and he or she will soon be lost to the market as a customer. The amount of profit made on each sale is determined by the accuracy of the scale and the manner in which the weight and money values are read.

Although many markets have made their meat departments self-service units, meat must still be weighed before it is sold. In many of these markets, meat wrappers are hired to do the actual weighing. Nonetheless, weighing is an operation that the apprentice meatcutter should be able to do.

Integrated System

Some self-service markets are using a combined weighing, computing, and label-printing system. The operator places in the machine a commodity insert from which the name of the product will be printed (such as "loin pork chops," "ground beef," and so forth); sets the tare or allowance for weight of the packaging material so that the weight of the material will not be added to the weight of the meat; and then sets the price per pound (0.5 kilogram). As soon as the package of meat is placed on the platter, the system takes over. It weighs the product, computes the selling price, and prints and issues a label that is ready to be affixed to the package (Figs. D-1 and D-2). Other scales are a little less automatic in that the operator must read off the weight and type it onto an attached "printing" machine that turns out the label for affixing to the package (Fig. D-3). A few of these scales are still in operation. Most of the scales in self-service markets today are automatic; and the wrapping machines are automatic or semiautomatic, depending on the volume of business (Fig. D-4).

Cylinder Scale

The cylinder scale, which was basic equipment in the service market, is used in some self-service markets today (Fig. D-5). This scale indicates at the top of the scale the sale price for the actual weight of the meat. The meatcutter first reads the figures along the upper or lower edges of the cylinder opening. These figures represent the price per pound (0.5 kilogram). Then the meatcutter follows the indicator, or reading line, which shows the amount the customer is to be charged. If the meatcutter's eye is in a true horizontal line with the indicator and the scale is in proper adjustment, the reading will be correct.

Method of Reading

The greatest care must be taken in reading the scale. Frequently, it is read from the wrong position. The resulting inaccuracies cause greater losses than any other error. Serious mistakes often occur in this way even when the scale is perfect.

When a tall person reads from a line of vision above the indicating line on a cylinder scale, he or she tends to see the weights and values below the indicating line. The resulting values and weights are greater than the correct amounts. A short person is inclined

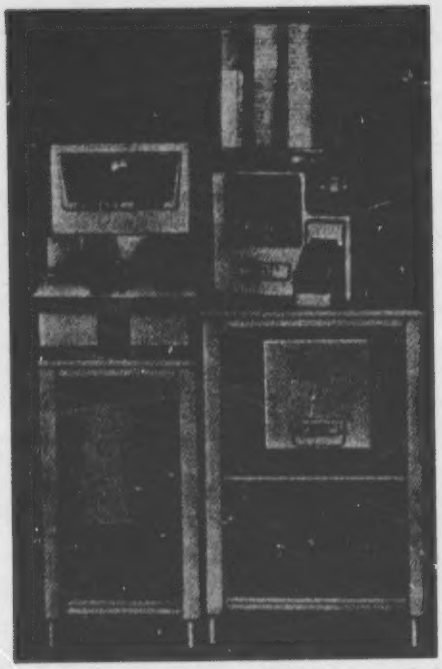


Fig. D-1. Combination weighing, computing, and label-printing system

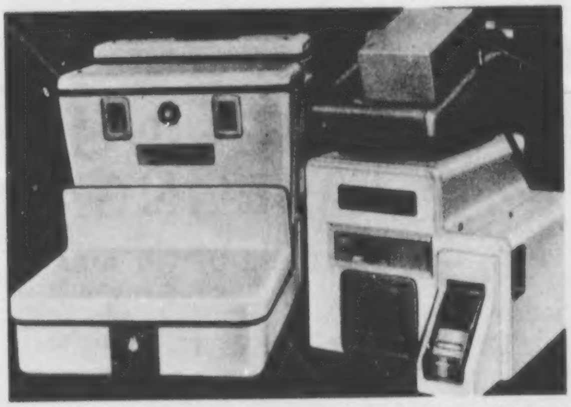


Fig. D-2. Automatic system with totalizer attached to indicate volume

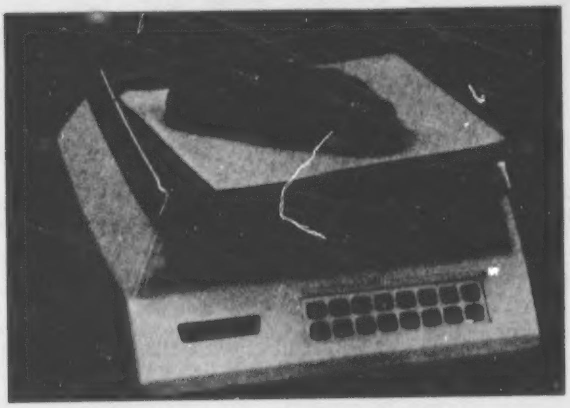


Fig. D-4. Electronic service scale

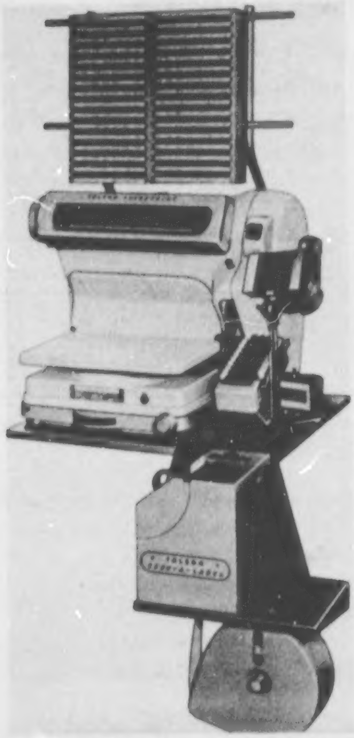


Fig. D-3. Weighing and computing system with printer attached

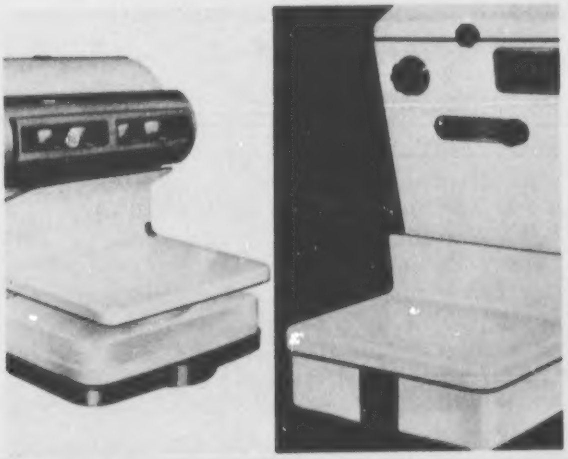


Fig. D-5. Types of cylinder scale

to read the scale from his or her line of vision at a point below the horizontal, and the computed values and weights he or she reads are less than the correct values and weights. Frequently, two persons of the same height read the scale differently. If one happens to be a little nearsighted, he or she leans forward to look more closely at the figures and lowers his or her line of vision. If the individual is farsighted, he or she raises his or her head and, thereby, the line of vision. The correct position in which to read the scale is with the eyes in a true horizontal line with the indicator.

As a help in correcting possible errors in the reading of a cylinder scale, some scales now are equipped with adjustable indicators that can be set for the different heights of the operators. This adjustable indicator also can be set for a variation in the prices of different items. On other scales other methods have been developed to eliminate parallax; that is, the apparent differences in the reading of a scale by persons of different heights.

Care of the Scale

Each state has a law requiring that all computing counter scales be level at the zero position. All scales and measuring devices must receive the approval seal of the Bureau of Measurement Standards. The Bureau of Measurement Standards does not have a tolerance of weight. Exactly 16 ounces make a pound (0.5 kilogram). Each customer must receive the exact weight of his or her purchase. Market operators are responsible for short weights and can be penalized accordingly. Because of the precision required in the weighing, only an experienced person should be allowed to work the scales. If at any time a meatcutter suspects that a scale is inaccurate, he or she should report this fact immediately to the supervisor and should not try to fix the scale. Only an experienced repair person should do this work.

Correct support. Vibration of the scale prevents satisfactory operation. This condition may occur if the scale is placed on an uneven counter or poorly constructed stand. The scale should be placed on a smooth, rigid support that is plumb and level. Otherwise, undue friction and binding will occur. Most of the modern computing scales have built-in spirit levels that indicate whether the scale is level and plumb. The leveling device for a scale usually consists of two or four leveling screws at the base of the scale. By lowering or raising these screws, the operator may adjust the scale to an exact level position. When the scale is level and plumb, the reading line should then be at the zero position. If it is not, a scale expert should be called to check the scale. The operator should not try to correct the scale.

Cleanliness. A scale that is cleaned daily presents a sanitary appearance and makes a good impression on customers. Meatcutters and merchants often are judged by the outward appearance as well as the accuracy of the meat scale. One that is clean and nice-looking will attract and please customers, but a dirty, ill-kept scale will drive them away.

When washing the scale, the meatcutter should make sure that the cloth is not too wet. If it is too wet, water from the cloth will run and settle in the bearings and eventually rust them. A damp cloth and soap will clean the scale perfectly, and a scale cleaned carefully and often can be kept looking like new for a long time. The platter of the scale requires more care than the body, because what the front is to the store, the platter is to the meat market. A dirty, bloody, unsightly platter on a scale is distasteful to the customer.

If the bearings, pivots, and other working parts are easily accessible, they should be kept clean and free of foreign substances. An accumulation of even small particles of dirt, rust, or any other foreign substance in the bearings or working parts causes the scale to work sluggishly and weigh light or "slow" because of the excess friction caused by the foreign matter. Additional meat must then be put on the platter to overcome such friction. The market thereby loses money.

The dashpot, also known as the hydraulic shock absorber or quick-stop device, regulates the movement of the chart in the cylinder scale and absorbs the shock caused when a piece of meat is tossed upon the platter. It consists of a cylinder-shaped metal pot filled with a light hydrocarbon oil. It resembles an old-fashioned churn. Inside the cylinder is the plunger disc, which has small holes that can be opened or closed by the turning of a little sleeve adjustment at the top of the plunger stem. This adjustment regulates the amount of oil that passes through. This oil movement controls the oscillation of the chart and brings it to a stop quickly.

In the summer, when the oil is slightly thinner and flows freely, the holes should be partly closed; in winter, when the oil is thicker, they should be opened a little more to allow passage of the oil. Turning the sleeve to the left opens the holes in the plunger disc, and turning to the right closes them. The adjustment sleeve should be set so that the chart goes an ounce (28.4 grams) or two beyond and returns quickly to the proper place. Any accumulation of dust or dirt in the dashpot causes the scale to work sluggishly. If the oil is found to be unclean, it should be replaced with clean oil recommended by the manufacturer. This will ensure the continued satisfactory operation of the scale.

General Rules

To obtain the maximum efficiency from the scale, the operator should remember the following rules:

- Do not use the platter of the scale as a writing desk.
- Do not place advertising matter on the scale.
- Oil only the dashpot of the scale with the special oil furnished for that purpose.
- Do not use the scale when packages or merchandise interfere with the free movement of the scale platter; otherwise, the market may lose money in overweight.
- Check the scale after it is moved to make sure that it is level and plumb in its new position.
- Notify the market manager immediately if the scale is not working properly.

A scale must be as delicate as a watch, yet rugged enough to withstand years of constant use. The satisfaction and service it gives will depend on the care it receives. This axiom is particularly true with the newer, complex weighing machines that are being used.

The instructor will demonstrate the proper care of each type of scale that the meatcutter will use.

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 1—USE AND CARE OF THE MEAT SCALE

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The allowance made for the weight of the packaging material used in wrapping meat is called the _1_.
   1. ________

2. The cylinder scale indicates in the opening at the top of the scale the _2_ _3_ according to the weight of the item.
   2. ________
   3. ________

3. As an aid in avoiding errors in reading the cylinder scale, some of these scales have _4_ indicators; thus, _5_ is eliminated.
   4. ________
   5. ________

4. The scales and measuring devices used by the meatcutter must be approved by the Bureau of _6_ _7_.
   6. ________
   7. ________

5. For accurate weighing, the cylinder scale should be placed on a smooth, rigid support that is _8_ _9_.
   8. ________
   9. ________

6. Most modern scales have built-in _10_ _11_ that indicate whether the scale is uneven.
   10. ________
   11. ________

7. An accumulation of particles of foreign substances in the bearings or working parts of the scale causes it to work sluggishly because of _12_.
   12. ________

8. The hydraulic shock absorber or quick-stop device, known as the _13_, regulates the movement of the chart in the cylinder scale and absorbs the shock caused when meat is placed on the platter.
   13. ________

9. Inside the cylinder-shaped shock absorber is a plunger disc, which has small holes that can be opened or closed by the turning of a little _14_ adjustment.
   14. ________

10. This adjustment is used to regulate the amount of _15_ that passes through.
    15. ________

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 2—PACKAGING MATERIALS

This topic, "Packaging Materials," is planned to provide answers to the following questions:

- **What types of packaging material are used in service markets?**
- **What types of packaging material are used in self-service markets?**
- **What are the characteristics of the different types of packaging material?**

The packaging material used by meatcutters has been changing very rapidly. Cellophane and pliofilm, which were the main packaging materials a short time ago, are now obsolete. To keep up-to-date, the meatcutter should check from time to time with the suppliers of packaging material. Packaging material will continue to change in the future.

Wrapping Materials

Wrapping materials used in the service market differ from those used in the self-service market.

Service Market

Wrapping materials normally used in the service market are wrapping paper, waxed paper, and gummed tape.

Wrapping paper. Butcher paper or wrapping paper used in the service market is sometimes referred to as kraft paper. It is a wood-pulp paper that is white or peach in color. Butcher paper comes in widths of 15 or 18 inches (38.1 or 45.7 centimetres). It has a rather smooth surface and high resistance to moisture penetration. Many other widths of paper are available, but these are the two most commonly used widths.

Waxed paper. Although its primary purpose is not to wrap things, waxed paper is included in the wrapped package and is considered a part of the wrapping supplies. It is a parchment-type paper impregnated with wax and cut into 10-inch (25.4-centimetre) squares. Its main purpose is to keep the scale clean.

Gummed tape. Gummed tape is a paper tape coated on one side with a water-soluble glue. It comes in rolls of many widths and in almost any color. Sometimes the name of the market or company is printed on the top side as a means of advertising or identification.

Self-Service Market

With the advent of self-service markets, the demand for new and different types of wrapping materials has produced the development of a whole new industry.

Film. In the early 1960s the types of film used in most self-service stores were cellophane and pliofilm. Each kind had its own characteristics, but neither met all wrapping requirements adequately. In 1965 a new film came on the market. This film differed from cellophane and pliofilm in that it met all the requirements for wrapping fresh and smoked meats, poultry, and fish for self-service.

Cellophane. Cellophane comes in two main types, coated and uncoated, and has many variations of each type. Some markets use only coated cellophane, but others use both because the uncoated type is less expensive and performs some wrapping operations satisfactorily.

Uncoated cellophane is not moistureproof and is, therefore, unsatisfactory for wrapping fresh red meat. It is used mostly for wrapping smoked and cured meats and frozen fish and poultry. In markets where both types of cellophane are used, great care must be taken to keep them separated and identified, because fresh red meat wrapped in uncoated cellophane will turn dark in minutes, thus becoming practically unsalable.

Coated cellophane has a coating of nitrocellulose on one side. The purpose of the coating is to make the cellophane moistureproof and, at the same time, allow oxygen to pass through to the meat. The penetration of oxygen into the meat is what keeps it red. Meat wrapped in coated cellophane stays red for about three days. Sometimes the coating on the cellophane is somewhat spotty; therefore, meat wrapped in such a sheet shows dark spots in those places where the coating is absent.

Both the coated and uncoated types of cellophane come in sheet form and are packaged 1,000 sheets to the package except for the 16-inch (40.6-centimetre) and 18-inch (45.7 centimetre) sheets, which are packaged 500 per package. The sheets are square, and they run in 1-inch (2.5-centimetre) graduations from 10 inches (25.4 centimetres) square to 18 inches (45.7 centimetres) square.

Coated cellophane also is made available in rolls for use with automatic wrapping machines. The rolls are approximately the same length as the rolls of butcher paper and come in the same widths as sheet cellophane.

Pliofilm. Pliofilm is a moistureproof, rubber-based film. Although it is transparent, it is not quite as clear as cellophane and does not have as much sheen. However, it does have one important characteristic in which it is superior to cellophane: it has elasticity. Cellophane stretches very little before tearing, but pliofilm can be stretched and formed to fit perfectly any type of meat sold in the market. Because of this ability, pliofilm formerly was used in packaging the hard-to-wrap items such as legs of lamb, hams, and extra-large roasts.

Polyvinyl film. Polyvinyl film is superior to cellophane and pliofilm. It is clearer, and its sheen is equal to that of cellophane. Polyvinyl is also equal to cellophane in its ability to keep red meat over a period of time, and it has the elasticity of pliofilm. This film can be used to wrap hard-to-wrap items such as legs of lamb, hams, and extra-large roasts. It comes in 15-inch (38.1-centimetre) and 18-inch (45.7 centimetre) rolls. Three types of polyvinyl film are being used in self-service meat markets. They are described as follows:

Extruded film. Extruded film is a versatile new film made of polyvinyl chloride. Ideal for packaging of all self-service meats, this economical wrap costs up to 5½ percent less than other films and up to 28 percent less than cellophane. Its clarity, sparkle, and sheen add sales appeal to virtually any cut of meat. The strength of extruded film and the tightness of its welded seals keep rewrapping to a minimum in spite of customer handling.

Cast film. Cast film is the finest premium film made. It is a precision-made, cast polyvinyl chloride film. The uniformity of its gauge is controlled with such precision that thick or thin spots, common with extruded materials, are virtually eliminated. Even the boniest cuts can be wrapped with cast film. It is puncture-resistant; thus, expensive rewraps can be avoided. Cast film has a clarity up to five times greater than that of any other competitive meat wrap on the market. Its precise gauge allows a more consistent oxygen permeability and helps fresh meat retain its freshness and color for added shelf life. Meat can be transferred from shopping bags to the home freezer without rewrapping.

Shrink film. Shrink film was the first shrinkable-type film developed for fresh meats. Such film has a 40 percent unilateral shrink, which provides a faster wrapping operation whether the wrap is used with high-speed automatic equipment or with the conventional wrap aid. For example, fresh meat wrapped in shrinkable film on a fully automatic system, complete with shrink tunnel, can be wrapped, sealed, weighed, and labeled at speeds of up to 1,800 packages per hour.

Shrinkable film is designed primarily for use with high-speed, fully automatic vacuum-packaging equipment, but it can be used as well in regular hand-wrap operations. The gentle shrink action minimizes the bleeding occasionally encountered in a conventional hand-wrap operation.

Polyvinyl chloride film is made in different gauges and has varying characteristics in unilateral shrink and bilateral shrink. This type of film is manufactured by several different companies, and the manufacturers can supply technical data and specific information on the different characteristics of their products.

Cryovac is heavier than most other wrapping films. It is used mostly for wrapping smoked meat. Where other shrink films take a dry heat, cryovac is used in dry or moist heat. Shrink film is used for vacuum-packed items.

Other Packaging Materials

To meet today's packaging requirements, manufacturers have made available tray products in more than 20 different sizes and depths. Several years ago the pulp tray was the most popular tray used; today, plastic (clear view) and styrofoam trays are the most popular.

Trays

The pulp tray is made from wood pulp. It is a molded tray with a turned-out lip that gives it greater strength. One drawback in using this kind of tray is that meat, when frozen, sticks to the bottom of the tray. Since about 70 percent of the meat purchased is home-frozen from one day to three weeks, this kind of tray is seriously deficient.

Plastic trays are clear and flexible and have good corner and sidewall strength. They are thinner than pulp or board trays and take up much less storage space. The bottoms are constructed with a corrugated or grid effect and provide depressions to contain the meat juice because the material itself absorbs none of these juices.

The styrofoam tray is used by many markets for the packaging of chicken. Most markets also use these trays for fresh meat and fish. Styrofoam trays are rigid and compact in shape and help retain the bloom of fresh red meats.

Cups

Early in the development of self-service packaging, the discovery was made that liver could not be packaged satisfactorily by the use of available films and trays; therefore, a heavily waxed cardboard cup was substituted. Cups with certain improvements are still the fastest and most popular method of packaging liver. Many other items, such as brains, sweetbreads, chicken giblets, and the like, together with such specialty items as crab meat, shrimp, and shrimp meat, are now also being sold in cups. Two types of cups are in common use; these are the waxed paper cup and the plastic cup. The plastic cup has two variations.

The original waxed cups were heavier than those used today, and they had a flat cardboard lid with a small cellophane window in the center. For the lid to be put in place, the worker had to slide it down inside the cup, where it fitted into an encircling groove about ¼ inch (0.6 centimetre) below the rim. This operation was difficult to perform. If not enough pressure was applied, the lid snapped back out. If too much pressure was applied, the lid pushed past the groove and buckled. Later, a plastic lid with a dropped rim was substituted. This lid, which covered the entire top of the cup and snapped into place easily over the rim, is essentially the same type of lid now in use and, except for being made of thinner paper, the cup is still the same.

Plastic cups, which are practically the same in shape as the waxed cups, come in several different colors. They hold up better than the paper cups, and they can also be washed and reused by customers as refrigerator boxes. The plastic cups are available at approximately the same price as the waxed cups; the trend is toward their adoption. They come in three different sizes: ½ pint (0.23 litre), 1 pint (0.47 litre), and 1½ pints (0.70 litre). The same lid fits all three sizes.

A new type of cup made of clear plastic is now being introduced. Instead of snapping on, the lid is heat-sealed to the cup by a special machine. This process is slower, but its use prevents the switching of lids by customers, a not uncommon practice. With an ordinary plastic cup, a customer can easily switch the lid from, for example, a cup of cheap pork liver to a cup of expensive calf liver. A customer also can open two cups of crab meat, completely fill one cup from the other, replace the lid, and check it out for the price originally fastened on the lid. This new cup will no doubt become popular not only because of the protective features afforded to the market, but because the clear plastic top makes it possible for the customer to inspect the contents.

Labels

One of the biggest problems of early self-service marketing was getting the labels to stay on the packages. Poor glue was the major cause of this problem. After being melted by heat, the glue became too hard when placed in a cold meat case and, consequently, the label popped off.

Today's labels are made of thinner paper. The glue is more quickly activated by heat and remains soft and slightly sticky after being placed on the package. Usually, if affixed correctly, these labels will tear before they can be pulled off. However, even today's labels will not stick if placed on an uneven surface where only part of the label contacts the film or if placed on a package wrapped with film that is wet from condensation. After the glue is heated, the label should be placed on the package quickly before the glue cools and should be pressed firmly so that all parts of the label contact the wrapping film. Label-switching is almost impossible if the labels have been fastened firmly.

Soakers

Soakers are pieces of blotter-type paper placed in the tray to absorb the juices or moisture from the meat. Soakers are most often used for fish, poultry, or large beef roasts that have a great deal of blood. Sometimes they are placed underneath the meat inside the package to absorb moisture directly from the meat. In other instances they are placed underneath the tray between the bottom of the tray and the film. Here they absorb only the moisture that escapes the tray, but they still keep it inside the package. This second method has considerable merit because the soaker is still performing the task for which it was designed. At the same time its blotter-like action is not drawing excessive amounts of juice from the meat.

Many markets do not permit the use of soakers at all, feeling that the customer who finds one inside a package of meat does not understand its purpose. In these markets it is felt that rewrapping wet packages daily is more practical. In other markets it is felt that a piece of paper towel is simpler to use than the specially manufactured soaker.

Where a soaker is used, extra tare must be allowed to offset the weight of the soaker in the package. Also, extra tare must be allowed to offset the weight of the absorbed moisture. In checking a package for weight, the representative of the Bureau of Measurement Standards removes the meat from the package and weighs only the meat. This weight must equal that recorded on the label, exclusive of the film, tray, label, soaker, and moisture in the package.

Bags

Polyethylene bags first were brought into the retail market as a quick and inexpensive means of packaging whole chickens. Now, as in the case of liver cups, other uses have been found for the bags. Sundry items (such as hog maws, pig snouts and ears, and beef tripe) and smoked items (such as ham hocks and bacon ends) are often bagged. In some markets legs of lamb and ham cuts are bagged when on sale. While this kind of package does not look as neat as the conventional one, the packaging process itself is much faster and less expensive.

Polyethylene bags usually are made by companies that specialize in the making of bags rather than the film itself. Three sizes of bags are available for packaging chicken. The smallest size is used primarily for bagging frying chickens and small stewing chickens; the next size, for bagging large stewing chickens and roasting chickens; and the largest, for bagging two or more fryers (generally done only when the chickens are on sale). A small bag, made of heavier film, is used by some markets to package liver.

Most markets prefer to use imprinted bags that carry the market or company name and, perhaps, a design to add color to the package. A few poultry growers are using bags with their names on them. They ship these bags in the crates together with the chickens. This technique is practiced only by the growers of extra-fancy poultry as a means of establishing their names in the poultry industry.

Cellophane Tape

Cellophane tape hardly can be considered a packaging material, and yet it definitely has a place in the packaging process. It is used only where other packaging methods or materials have failed, at least partially. A package that has not been sealed properly can be sealed securely with a short piece of cellophane tape. With this tape small tears in the wrapping film made by sharp bones or fingernails can be repaired, or loose labels can be fastened to a package. One can perhaps judge the efficiency of a wrapper by the amount of cellophane tape used. In any case, no market would want to operate without it. Although this tape is fairly expensive, the savings, both in time and materials, far offset its cost.

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 2—PACKAGING MATERIALS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The butcher paper or wrapping paper used in the service market is sometimes referred to as ___1___ paper. — 1. ________

2. Butcher paper is a ___2___-pulp paper that comes in widths of ___3___ or ___4___ inches. — 2. ________ 3. ________ 4. ________

3. Waxed paper is a ___5___-type paper impregnated with wax and cut into ___6___-inch squares. — 5. ________ 6. ________

4. Since it is not ___7___, uncoated cellophane is unsatisfactory for wrapping fresh red meat. — 7. ________

5. Because of its ability to ___8___, pliofilm is normally used to package hard-to-wrap items. — 8. ________

6. Polyvinyl film combines the ___9___ quality of cellophane and the ___10___ of pliofilm. — 9. ________ 10. ________

7. Meat trays are made of either ___11___ pulp or ___12___; the latter is preferred. — 11. ________ 12. ________

8. Plastic cups are more popular than paper cups, because the plastic cups hold up better and can be washed and reused by customers as ___13___ boxes. — 13. ________

9. When a soaker is used in a package of meat, extra ___14___ must be allowed to offset the weight of the soaker. — 14. ________

10. Originally, polyethylene bags were brought into the retail market to provide a quick and inexpensive means of packaging whole ___15___. — 15. ________

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 3—LABELING

This topic, "Labeling," is planned to provide answers to the following questions:

- **What are labeling laws?**
- **What are the responsibilities of labelers?**
- **What are the requirements of labeling?**

Labeling is an important part of the meat operation. Although the wrapper will be doing most of the labeling, everyone in the shop will be doing some labeling. They all should be familiar with the labeling laws and procedures.

Price Label

Price per pound, total selling price, and total weight are required by law on the label of each package offered for sale. An allowance known as a tare is required for the packaging material used, so that it is not included in the weight appearing on the label.

The person who is pricing these packages is responsible for the correct labeling. In case of a violation, the person doing the labeling has first responsibility; second is the meat manager, next is the store manager, and so forth. A citation may be issued, and the penalty will be decided by the court as prescribed by law. The label must provide the following information:

1. The name of the meat product, such as "beef," "veal," "pork," or "lamb."
2. The name of the primal cut that the retail cut comes from, such as "beef loin," "veal loin," "pork loin," or "lamb loin."
3. The name of the retail cut, such as "beef loin T-bone," "veal loin T-bone," "pork loin chop," or "lamb loin chop."

Ingredients Label

All mixed meats must have ingredients labels such as: "sausage," "meat loaf," "corn beef," "bacon," "ham," and so forth. The label must list the ingredients in the order of quantity with the larger quantity listed first. If it is packed off the premises, the name of the packer or the company for which it is packed must be shown.

Law Enforcement

The Bureau of Measurement Standards in the State Department of Food and Agriculture is responsible for the enforcement of state laws pertaining to anything sold by weight or measurement. The law sets forth the punishment for each violation in the same way that a traffic violation is handled. Each county is responsible for its own area.

The State Department of Consumer Affairs checks for false labeling and advertising.

State and county health agencies also are responsible for checking the ground beef and sausage fat contents. The fat content of beef allowed by law is 30 percent. Pork sausage is allowed 50 percent fat by law.

NOTE: Representatives of one or more of the enforcement agencies may be asked by the instructor to speak to the class.

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 3—LABELING

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The agency that checks for short weight is the 1 of 2 3 .

1. ________
2. ________
3. ________

2. The agency that checks for false labeling is the 4 5 of 6 7 .

4. ________
5. ________
6. ________
7. ________

3. All mixed meats must have 8 labels.

8. ________

4. The fat content of beef allowed by law is 9 percent.

9. ________

5. Pork sausage is allowed 10 percent fat by law.

10. ________

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 4—THE METRIC SYSTEM

This topic, "The Metric System," is planned to provide answers to the following questions:

- **Why should we study the metric system?**
- **Where did the metric system come from?**
- **Who uses the metric system?**
- **What are the advantages of the metric system?**

The metric system was developed in France at the end of the eighteenth century. The use of the system gradually spread until today almost all nations use it exclusively except England and the United States, which use the system in science, industry, and many other areas. Attempts to convert the U.S. to the metric system have increased during the past ten years.

The Metric System

The metric system is a decimal system in which all measurements are divisible by ten. In the current U.S. system, to the contrary, there are 16 ounces to the pound and 2,000 pounds to the ton. A foot has 12 inches; a rod, 16-2/3 feet; a yard, 3 feet; and a mile, 1,760 yards or 5,280 feet.

The metric system is a simple decimal system; ours, a much more complicated system. Our system may seem simple to us because we have always used it. The main reason we need to learn the new system, the metric system, is that:

1. It is only a matter of time until we will be using the metric system widely.
2. All automobiles and machinery from foreign countries are made in accordance with metric standards.
3. We need to standardize our method of measuring with the method used in the rest of the world.
4. We need the simplicity of the system.
5. Fewer mistakes in mathematics will be made by students.

Units of Metrics

The metre is the basic unit of length in the metric system. Six prefixes are used with the unit. The three prefixes used to signify lengths under one metre are: (1) *deci,* which equals one tenth; (2) *centi,* one hundredth; and (3) *milli,* one thousandth.

The three prefixes used to designate lengths greater than the metre are: (1) *deko,* which equals ten times the metre; (2) *hecto,* one hundred times the metre; and (3) *kilo,* one thousand times the metre.

Weight

The gram is the basic unit of weight in the metric system. The same six prefixes are used with the gram as were used with the metre.

Volume

The litre is the basic unit of volume in the metric system. The same six prefixes used with the gram and metre are again used with the litre.

Temperature Conversion

32° F. = 0° C (Freezing point)
122° F. = 50° C
212° F. = 100° C (Boiling point)

Length Conversion

1 inch = 2.5 centimetres (cm)
2 inches = 5.1 centimetres
3 inches = 7.6 centimetres
4 inches = 10.2 centimetres
5 inches = 12.7 centimetres
6 inches = 15.2 centimetres
7 inches = 17.8 centimetres
8 inches = 20.3 centimetres
9 inches = 22.9 centimetres
10 inches = 25.4 centimetres
11 inches = 27.9 centimetres
12 inches = 30.5 centimetres
24 inches = 61.0 centimetres
36 inches = 91.4 centimetres

Weight Conversion

1 ounce = 28 grams (g)
2 ounces = 56 grams
3 ounces = 85 grams
4 ounces = 112 grams
5 ounces = 140 grams
6 ounces = 168 grams

7 ounces = 196 grams
8 ounces = 224 grams
9 ounces = 252 grams
10 ounces = 280 grams
11 ounces = 308 grams
12 ounces = 336 grams
13 ounces = 364 grams
14 ounces = 392 grams
15 ounces = 420 grams
16 ounces = 448 grams
1 pound = 0.45 kilogram (km)
2 pounds = 0.90 kilogram
3 pounds = 1.35 kilograms
4 pounds = 1.80 kilograms
5 pounds = 2.25 kilograms
6 pounds = 2.70 kilograms
7 pounds = 3.15 kilograms
8 pounds = 3.60 kilograms
9 pounds = 4.05 kilograms
10 pounds = 4.50 kilograms
11 pounds = 4.95 kilograms
12 pounds = 5.40 kilograms
13 pounds = 5.85 kilograms
14 pounds = 6.30 kilograms
15 pounds = 6.75 kilograms
16 pounds = 7.20 kilograms
17 pounds = 7.65 kilograms
18 pounds = 8.10 kilograms
19 pounds = 8.55 kilograms
20 pounds = 9.00 kilograms

Volume Conversion

1 cup = 0.24 litre (l)
1 pint = 0.47 litre
1 quart = 0.95 litre
1 gallon = 3.8 litres

NOTE: Reference books on metrics that are recommended are the following:

1. *Metrics Made Easy.* Available from Barron's Educational Series, 113 Crossways Park Drive, Woodbury, NY 11797.
2. *The Metric Book.* Available from Dell Publishing Co., Inc., 1 Dag Hammarskjold Plaza, 245 E. 47th St., New York, NY 10017.

UNIT D—WEIGHING, PACKAGING, AND LABELING

TOPIC 4—THE METRIC SYSTEM

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. All units of the metric system are divisible by ___1___. 1. ________
2. The metric system is a ___2___ system. 2. ________
3. The ___3___ is the basic unit of weight in the metric system. 3. ________
4. The metric system was started in ___4___. 4. ________
5. The litre is the basic unit of ___5___ in the metric system. 5. ________
6. A temperature of 32° F. is the same as ___6___ Celsius. 6. ________
7. A 9-inch measurement is the same as ___7___ centimetres. 7. ________
8. A pound is equal to ___8___ grams. 8. ________
9. A gallon is equal to ___9___ litres. 9. ________
10. A quart is the same as ___10___ litre. 10. ________

UNIT E MEAT AND FISH AS FOODS

TOPIC 1—STRUCTURE, COMPOSITION, AND FOOD VALUE OF MEAT

This topic, "Structure, Composition, and Food Value of Meat," is planned to provide answers to the following questions:

- **What is the basic structure of meat?**
- **Why is it important for a meatcutter to have an understanding of meat structure?**
- **How does the composition of meat affect its food value?**

The structure of meat—the kind and amount of muscles, connective tissue, and fat comprising a cut—helps determine how tender the meat is and how it should be cooked. The composition of that meat—the food constituents that comprise it—helps determine its food value. Because of this interrelationship, these subjects are dealt with in the same topic.

Beef, Pork, Lamb, Veal, and Poultry

Like fish, beef, pork, lamb, veal, and poultry are excellent sources of protein, vitamins, minerals, and fats. These meats are so near the makeup of our body that the body assimilates about 97 percent of the intake. Meat, sometimes known as the perfect food, is only surpassed by milk, which has calcium, something meat lacks except in the bone.

Meat of all kinds is rich in the easily digestible proteins and in amino acids, vitamins, minerals, and animal fats (Table E-1). About one-third of our protein intake should be meat protein. Sometimes some of the other proteins are referred to as incomplete because they are not as digestible as meat is.

Study Assignment

John R. Romans and P. Thomas Ziegler. *The Meat We Eat* (Eleventh edition). Danville, Ill.: The Interstate Printers & Publishers, Inc., 1977. Read pp. 625—55.

TABLE E-1
Food Energy and Percentage of U.S. Recommended Daily Allowance for Eight Nutrients Provided by a Specified Amount of Meat or Fish Products

Product	Measure	Weight, grams	Food energy, calories	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Meat											
Bacon, broiled or fried	2 slices	15	90	10	*	*	6	2	4	*	2
Bacon, Canadian style, sliced, 3/16 in. (1.8 cm) thick, broiled or fried, drained	1 slice	21	60	15	*	*	15	2	4	*	4
Beef, cooked											
Chuck, braised, simmered, or pot-roasted											
Piece, lean and fat	3 oz.	85	250	50	*	*	2	10	20	*	15
Lean only	3 oz.	85	160	60	*	*	4	10	20	2	20
Chopped or diced, lean and fat	1 cup	140	410	80	*	*	4	15	30	2	25
Lean only	1 cup	140	270	90	*	*	6	20	30	2	30
Ground, lean only	1 cup	110	210	70	*	*	4	15	25	2	25
Corned, boneless											
Fresh cooked	3 oz.	85	320	45	*	*	2	8	6	*	15
Canned, sliced, ⅜ in. (0.9 cm) thick	1 slice	40	90	20	*	*	*	6	6	*	10
Flank steak	3 oz.	85	170	60	*	*	4	10	20	2	20
Ground beef, broiled to well-done stage											
Regular	3 oz.	85	270	50	*	*	4	10	25	*	15
Lean	3 oz.	85	190	50	*	*	6	10	25	*	15
Plate beef, simmered											
Lean and fat	3 oz.	85	370	40	2	*	2	8	15	*	15
Lean only	3 oz.	85	170	60	*	*	2	10	20	2	20
Roasts											
Rib											
Sliced, lean and fat	3 oz.	85	370	40	2	*	2	8	15	*	10
Lean only	3 oz.	85	210	60	*	*	4	10	20	*	15
Rump											
Sliced, lean and fat	3 oz.	85	300	45	*	*	4	8	20	*	15
Lean only	3 oz.	85	180	60	*	*	4	10	20	*	15
Chopped or diced, lean and fat	1 cup	140	490	70	2	*	6	15	30	2	25
Lean only	1 cup	140	290	90	*	*	6	20	35	2	30
Ground, lean only	1 cup	140	230	70	*	*	6	15	30	2	25
Steaks, braised, broiled or sautéed											
Round											
Lean and fat	3 oz.	85	220	60	*	*	4	10	25	*	15
Lean only	3 oz.	85	160	60	*	*	4	10	25	2	15

(continued)

TABLE E-1 (continued)

Product	Measure	Weight, grams	Food energy, calories	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Steaks, broiled											
Club, porterhouse, or T-bone											
Lean and fat	3 oz.	85	400	35	2	*	4	8	20	*	10
Lean only	3 oz.	85	190	60	*	*	4	10	25	*	15
Sirloin											
Lean and fat	3 oz.	85	330	45	*	*	4	8	20	*	15
Lean only	3 oz.	85	180	60	*	*	6	10	25	2	20
Beef, dried or chipped	1 oz.	28	60	20	*	*	2	6	6	*	8
Lamb, cooked											
Chops, broiled											
Loin											
Lean and fat	3.5 oz.	99	360	50	*	*	8	8	15	*	6
Lean only	2.3 oz.	65	120	40	*	*	6	10	20	*	6
Rib											
Lean and fat	3.2 oz.	92	370	40	*	*	8	15	25	*	8
Lean only	2 oz.	57	120	35	*	*	6	10	20	*	8
Roasts, roasted											
Leg											
Sliced, lean and fat	3 oz.	85	240	50	*	*	8	15	25	*	8
Lean only	3 oz.	85	160	60	*	*	10	15	25	2	10
Chopped or diced, lean and fat	1 cup	140	390	80	*	*	15	20	40	2	15
Lean only	1 cup	140	260	90	*	*	15	25	45	2	15
Shoulder											
Sliced lean and fat	3 oz.	85	290	40	*	*	8	10	20	*	6
Lean only	3 oz.	85	170	50	*	*	8	15	25	*	8
Chopped or diced, lean and fat	1 cup	140	470	70	*	*	10	20	35	2	10
Lean only	1 cup	140	290	80	*	*	15	25	40	2	15
Pork, cured, cooked											
Ham, light cure, roasted											
Sliced, lean and fat	3 oz.	85	250	40	*	*	25	8	15	*	10
Lean only	3 oz.	85	160	50	*	*	35	10	20	*	15
Chopped or diced, lean and fat	1 cup	140	410	70	*	*	45	15	25	2	20
Lean only	1 cup	140	260	80	*	*	60	20	30	2	25
Ground, lean only	1 cup	110	210	60	*	*	45	15	25	2	20
Shoulder cuts (Boston butt or picnic), roasted											
Sliced, lean and fat	3 oz.	85	280	45	*	*	30	10	20	*	15
Lean only	3 oz.	85	210	50	*	*	35	10	20	*	15
Chopped or diced, lean and fat	1 cup	140	340	90	*	*	60	20	35	2	30
Ground, lean only	1 cup	110	270	70	*	*	45	15	30	2	20

(continued)

TABLE E-1 (continued)

Product	Measure	Weight, grams	Food energy, calories	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Pork, fresh-cooked											
Ham, roasted											
Sliced, lean and fat	3 oz.	85	320	45	*	*	30	10	20	*	15
Lean only	3 oz.	85	180	60	*	*	35	15	25	2	20
Chopped or diced, lean and fat	1 cup	140	520	70	*	*	45	20	30	2	25
Lean only	1 cup	140	300	90	*	*	60	25	40	2	30
Ground, lean only	1 cup	110	240	70	*	*	45	20	30	2	25
Loin, baked or roasted											
Sliced, lean and fat	3 oz.	85	310	45	*	*	50	15	25	*	15
Lean only	3 oz.	85	220	60	*	*	60	15	30	2	20
Chopped or diced, lean and fat	1 cup	140	510	80	*	*	90	20	40	2	25
Lean only	1 cup	140	360	90	*	*	100	25	45	2	30
Loin chops, broiled											
Lean and fat	2.7 oz.	78	310	45	*	*	50	15	25	*	15
Lean only	2 oz.	56	150	40	*	*	40	10	20	*	10
Spareribs, braised, lean and fat	3 oz.	85	370	40	*	*	25	10	15	*	10
Shoulder cuts (Boston butt or picnic), roasted											
Sliced, lean and fat	3 oz.	85	300	40	*	*	30	10	2[illegible]	*	15
Lean only	3 oz.	85	210	50	*	*	35	15	20	*	15
Chopped or diced, lean and fat	1 cup	140	490	70	*	*	45	20	30	2	25
Lean only	1 cup	140	340	80	*	*	60	20	35	2	25
Ground, lean only	1 cup	110	270	70	*	*	45	20	30	2	20
Rabbit, domesticated, stewed	3 oz.	85	180	60	*	*	2	4	50	2	8
Veal, medium fat, cooked											
Boneless cuts, braised, pot-roasted or stewed											
Sliced	3 oz.	85	200	60	*	*	6	15	25	*	15
Chopped or diced	1 cup	140	330	90	*	*	8	25	45	2	25
Cutlet, braised or broiled	3 oz.	85	180	50	*	*	4	10	25	*	15
Loin, braised or broiled											
Piece	3 oz.	85	200	50	*	*	4	10	25	*	15
Chopped or diced	1 cup	140	330	80	*	*	6	20	40	2	25
Rib, roasted											
Sliced	3 oz.	85	230	50	*	*	8	15	35	*	15
Chopped or diced	1 cup	140	380	80	*	*	10	25	60	2	25
Ground	1 cup	110	300	70	*	*	10	20	45	2	20
Poultry											
Chicken, canned, meat only, boned	1 cup	205	410	100	10	15	6	15	45	4	15
Chicken, cooked											
Flesh only, broiled	3 oz.	85	120	45	2	*	2	10	40	*	8
Breast, fried, with bone	½ breast	94	160	60	2	*	2	10	60	*	8

(continued)

TABLE E-1 (continued)

Product	Measure	Weight, grams	Food energy, calories	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Drumstick, fried, with bone	1 drumstick	56	90	25	2	*	2	8	15	*	4
Thigh, fried, with bone	1 thigh	65	120	35	2	*	2	15	20	*	6
Chicken, hens or cocks, stewed											
Light meat without skin											
Sliced	3 oz.	85	150	60	2	*	2	4	45	*	6
Chopped or diced	1 cup	140	250	100	4	*	2	8	80	2	10
Dark meat without skin											
Sliced	3 oz.	85	180	60	4	*	4	10	35	2	8
Chopped or diced	1 cup	140	290	90	8	*	6	15	60	2	15
Chicken, roasters, roasted											
Light meat without skin											
Sliced	3 oz.	85	160	60	2	*	4	4	50	*	6
Chopped or diced	1 cup	140	260	100	4	*	8	8	80	2	10
Dark meat without skin											
Sliced	3 oz.	85	160	60	2	*	6	10	25	2	8
Chopped or diced	1 cup	140	260	90	4	*	10	15	35	2	15
Goose, domesticated, roasted	3 oz.	85	200	60	8	*	6	8	40	2	8
Turkey, canned, boneless	1 cup	205	410	100	6	*	2	15	50	2	15
Turkey, roasted											
Light meat without skin											
Sliced	3 oz.	85	150	60	2	*	2	8	45	*	6
Chopped or diced	1 cup	140	250	100	2	*	4	10	80	2	10
Dark meat without skin											
Sliced	3 oz.	85	170	60	4	*	2	10	20	2	10
Chopped or diced	1 cup	140	280	90	6	*	4	20	30	2	20
Variety meats											
Heart, beef, lean, braised											
Sliced	3 oz.	85	160	60	*	2	15	60	35	*	30
Chopped or diced	1 cup	145	270	100	*	2	25	100	60	*	50
Kidney, beef, braised	3 oz.	85	210	60	20	*	30	240	45	2	60
Liver											
Beef, fried	3 oz.	85	200	50	910	40	15	210	70	*	40
Calf, fried	3 oz.	85	220	60	560	50	15	210	70	2	70
Chicken, simmered											
Whole	1 liver	25	40	15	60	6	2	40	15	*	10
Chopped	1 cup	140	230	80	340	35	15	220	80	2	70
Hog, fried	3 oz.	85	210	60	250	30	20	220	100	2	140
Roe, herring, canned	3 oz.	85	100	40	*	4	6	40	6	2	6
Sausage, cold cuts, and lunch meat											
Bologna, slice, ⅜ in. (0.9 cm) thick	1 oz.	28	80	8	*	*	4	4	4	*	2
Braunschweiger, slice ¼ in. (0.6 cm) thick	1 oz.	28	90	10	35	*	4	25	10	*	10

(continued)

TABLE E-1 (continued)

Product	Measure	Weight, grams	Food energy, calories	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Deviled ham, canned	1 tbsp.	13	45	4	*	*	2	*	*	*	2
Frankfurter, heated	1 frank	56	170	15	*	*	6	6	6	*	4
Ham, boiled	1 oz.	28	70	10	*	*	8	2	4	*	4
Knockwurst, link	1 link	68	190	20	*	*	8	8	8	*	8
Polish sausage, link	1 link	76	230	25	*	*	15	8	10	*	10
Pork sausage, cooked											
Pattie or link (raw)	1 pattie or 2 links	27	130	10	*	*	15	6	4	*	4
Salami, dry type	1 oz.	28	130	15	*	*	8	4	8	*	6
Cooked	1 oz.	28	90	10	*	*	4	4	6	*	4
Vienna sausage, canned	1 sausage	16	40	4	*	*	*	2	2	*	2
Sweetbreads (thymus), beef, braised	3 oz.	85	270	50	*	*	4	8	15	*	8
Tongue, beef, medium fat, braised	1 oz.	28	70	15	*	*	*	4	4	*	4
Fish and shellfish											
Anchovy, pickled, not heavily salted, flat or rolled, canned	5 anchovies	20	35	8	*	*	*	2	6	4	4
Bass, black sea, baked, stufied	3 oz.	85	220	30	*	*	6	4	8	2	4
Bass, striped, oven-fried	3 oz.	85	170	40	*	*	6	2	8	2	4
Bluefish											
Baked or broiled with butter	3 oz.	85	140	50	*	*	6	4	8	2	4
Fried	3 oz.	85	170	45	2	*	6	6	8	2	4
Clams											
Canned, drained solids (chopped)	1 cup	160	160	60	4	*	2	10	8	8	35
Raw, meat only	4 or 5 clams	70	60	15	2	10	4	6	4	4	30
Cod, broiled with butter	3 oz.	85	140	60	4	*	4	6	15	2	4
Crabmeat, including blue, rock and king											
Canned, drained solids	3 oz.	85	90	35	20	*	4	4	8	4	4
Cooked, steamed	3 oz.	85	80	35	35	4	10	4	10	4	4
Fish stick, frozen, breaded, cooked	1 stick	28	50	10	*	*	*	2	2	*	*
Flounder, baked with butter	3 oz.	85	170	60	*	4	4	4	10	2	6
Haddock, pan-fried or oven-fried	3 oz.	85	140	35	*	4	2	4	15	4	6
Halibut, Atlantic and Pacific, broiled with butter	3 oz.	85	150	50	10	*	2	4	35	2	4
Herring, canned, smoked, kippered, fillet	1 fillet	40	80	20	*	*	*	6	6	2	4
Lobster, northern, cooked	3 oz.	85	80	35	*	*	6	4	6	6	4
Mackerel, Atlantic, broiled with butter	3 oz.	85	200	40	8	*	8	15	35	*	6
Ocean perch, Atlantic (redfish)											
Fried	3 oz.	85	190	35	*	*	6	6	8	2	6
Frozen, breaded, fried, reheated fillet	3.1 oz.	88	280	35	*	*	6	6	8	2	6

(continued)

TABLE E-1 (continued)

Product	Measure	Weight, grams	Food energy, calories	Protein	Vitamin A	Vitamin C	Thiamin	Riboflavin	Niacin	Calcium	Iron
Oysters											
Eastern, raw, meat only	1 cup	240	160	45	15	120	25	25	30	25	70
Pacific, raw, meat only	1 cup	240	220	60	15	120	20	25	15	20	100
Fried	1.6 oz.	45	110	8	4	20	6	8	6	6	20
Rockfish, oven-steamed	3 oz.	85	90	35	10	2	2	6	35	2	4
Salmon											
Canned, drained											
Pink	3 oz.	85	100	30	*	*	2	8	30	15	4
Sockeye (red)	3 oz.	85	120	30	4	*	2	6	25	20	4
Steak, broiled or baked with butter	3 oz.	85	160	50	2	*	10	2	40	10	6
Smoked	1 oz.	28	50	15	*	*	*	4	4	*	2
Sardines, Atlantic, canned in oil	3 oz.	85	170	45	4	*	2	10	25	35	15
Scallops, frozen, breaded, reheated	1 scallop	25	50	10	*	*	*	2	*	2	4
Shad, baked with butter and bacon	3 oz.	85	170	45	*	*	8	15	35	2	2
Shrimp											
Canned, meat	3 oz.	85	100	45	2	*	*	2	8	10	15
French-fried	3 oz.	85	190	40	*	*	2	4	10	5	10
Swordfish, broiled with butter	3 oz.	85	140	50	35	*	2	2	45	2	6
Tuna											
Canned in oil, drained solids	3 oz.	85	170	60	2	*	2	6	50	*	8
Canned in water, solids and liquid	3 oz.	85	110	50	*	*	*	6	60	*	8

*None or less than 1 percent.

UNIT E—MEAT AND FISH AS FOODS

TOPIC 1—STRUCTURE, COMPOSITION, AND FOOD VALUE OF MEAT

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The edible meat of carcasses is composed primarily of striated or ___1___ muscles, which are mostly connected with the skeleton and thus are called ___2___ muscles.
   1. ________
   2. ________

2. The edible organs and glands are called glandular or ___3___ meats to contrast them with the meats of the ___4___ muscles.
   3. ________
   4. ________

3. Characteristic of less tender cuts of meat is the presence of large amounts of ___5___ tissue.
   5. ________

4. The protein content of meat is about ___6___ percent in pork and about ___7___ percent in beef, veal, and lamb.
   6. ________
   7. ________

5. Saturated fats, which are found in quality meats, are ___8___ and ___9___; unsaturated fats, which are found in lower grades, are ___10___ and ___11___.
   8. ________
   9. ________
   10. ________
   11. ________

6. Since fat is low in moisture, a high ___12___ content lowers the total ___13___ content of a carcass or cut.
   12. ________
   13. ________

7. Muscle meats and, more especially, ___14___ meats are exceptionally rich in iron and ___15___.
   14. ________
   15. ________

8. The color of ___16___ meat is important in determining the age of a carcass, because the darker the meat, the ___17___ the animal.
   16. ________
   17. ________

9. Color of fat is not a true index of ___18___, but a white or creamy white fat is characteristic of young ___19___-fattened animals.
   18. ________
   19. ________

10. The intermingling of fat among the muscle fibers of a carcass is known as ___20___.
    20. ________

UNIT E—MEAT AND FISH AS FOODS

TOPIC 2—MEAT BY-PRODUCTS

This topic, "Meat By-Products," is planned to provide answers to the following questions:

- **What is the definition of a meat by-product?**
- **What are the basic classifications of meat by-products?**
- **Is the monetary value of meat by-products important to the meat industry?**

In many cases the sale of packinghouse by-products has exceeded the sale of meat itself. Animal by-products are now used in almost every area of human activity. Those from cattle contribute the greatest percentage of return, followed by those from sheep and hogs.

Animal by-products are divided into two classifications, edible and inedible. Included in the edible group are such products as livers, tongues, kidneys, and sweetbreads, all of which are discussed elsewhere in this text. The present topic is confined to inedible by-products, which are more numerous than the edible type.

Study Assignment

Romans and Ziegler, *The Meat We Eat*. Read pp. 241—62.

UNIT E—MEAT AND FISH AS FOODS

TOPIC 2—MEAT BY-PRODUCTS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Animal by-products are divided into __1__ classifications.

1. ________

2. By far the greatest number of items manufactured from animals is made from __2__ by-products.

2. ________

3. Margarine is basically composed of __3__ food fat, __4__ milk, and __5__.

3. ________
4. ________
5. ________

4. Color is added to margarine in the form of __6__ or a __7__ color.

6. ________
7. ________

5. Animals provide __8__ oil and __9__ as raw materials for the manufacture of soap.

8. ________
9. ________

6. The raw materials derived from animals to produce gelatin and glue are high in __10__.

10. ________

7. The main types of glue made from animals are __11__ glue, __12__ glue, and __13__ albumin glue.

11. ________
12. ________
13. ________

8. The types of gelatin derived from animals are __14__ gelatin and __15__ gelatin.

14. ________
15. ________

9. Most residue from packing plants is made into __16__ food and is used to supplement the necessary __17__ for hog and poultry rations; very little is made into __18__.

16. ________
17. ________
18. ________

10. Dry __19__ is used almost exclusively in the manufacture of lard and in the extraction of edible and inedible fats and __20__.

19. ________
20. ________

UNIT E—MEAT AND FISH AS FOODS

TOPIC 3—PRESERVATION OF MEAT

This topic, "Preservation of Meat," is planned to provide answers to the following questions:

- **What are the various methods of preserving meats?**
- **What is meant by cryogenic freezing?**
- **What are the advantages and disadvantages of the various methods of preserving meats?**

Meat has always presented a preservation problem. The primary methods of preservation now in use may be grouped under the headings of cold storage, freezing, curing, and canning.

Methods of Preservation

One of the earliest methods of preservation was probably dry salting and pickling; other curing processes were added through the centuries. Today, cold storage and freezing have become the dominant means of preserving food.

Cold Storage

Cold storage of meat involves keeping the meat at temperatures slightly above the freezing point, usually around 36° F. (2.2° C), and at a humidity level of 80 to 85 percent. After the carcass has been dressed, it must be cooled quickly to increase its storage life and to prevent changes in its nutritive content.

Freezing

Meat may be kept longer if it is frozen and held at temperatures of less than 0° F. (-18° C), preferably at -10° to -15° F. (-23° to -26° C). The actual freezing process may take place over a longer period at -5° to -15° F. (-20° to -26° C) or at quick freezing of -25° to -50° F. (-32° to -45° C). Meat so frozen may be held for long periods of time with no effect on quality. Recommendations are that beef should be held no longer than 6 to 12 months; veal and lamb, 6 to 9 months; fresh pork, 3 to 6 months; and sausage and ground meat, 1 to 3 months. If meat has been frozen and then thawed, it is more subject to damage by microorganisms, because they can penetrate the broken cells.

Speed of freezing has long been recognized as the most important factor in governing the quality of frozen foods. It is, of course, the water in the meat that freezes. As water freezes, it assumes the shape of minute, solid, sharp-edged crystals. The longer the freezing process takes, the larger these crystals grow. In slower freezing methods the ice crystals grow large enough to puncture and rupture plant and animal tissues. Thus, when slow-frozen foods thaw, their internal liquids leak away through ruptured tissues, carrying with them both flavor and nutritional value. In damaging the tissue, slow crystal growth also destroys the natural texture of the meat.

Nitrogen freezing is not new to the food industry. In 1925 a leading pioneer in frozen foods was experimenting with a nitrogen-immersion system of freezing foods. The system was abandoned because of the high cost of operation. Because of the advent of cheaper nitrogen and improved insulation techniques, the industry is reexamining the commercial capabilities of this process.

Curing

Curing of meat by various methods has been known for centuries. These methods fall under one of two headings, brine curing and dry curing. Common table salt is the basis of all curing processes; other ingredients such as sugar, saltpeter, and sodium nitrate salts are often added.

Pork is the meat most often cured. The principal cuts used are hams, shoulders, picnics, sides, and bellies (for bacon); backs and heavy sides (for salt pork); and boneless loins (for Canadian bacon). The beef cuts most frequently cured are plates, briskets, rumps, flanks, and chuck and rounds (in the lower-grade cuts). Research is being conducted into the curing of the leg and loin of lamb.

Canning

Canning is a meat-preserving process that has been in use for many years. Frozen meats may be canned after thawing, but because of the susceptibility of these meats to bacterial attack, they should be canned immediately upon thawing. During storage, canned meats lose some thiamin. On the other hand, riboflavin content does not appear to be affected by the average storage temperatures.

A new, quick, high-temperature canning process that avoids overcooking has been developed for a number of foods. However, before such a process can be used for food that is packed in chunks, such as meat or fish, newer developments such as high-frequency electronic heating will have to be perfected.

Study Assignment

Romans and Ziegler, *The Meat We Eat*. Read pp. 559—611.

UNIT E—MEAT AND FISH AS FOODS

TOPIC 3—PRESERVATION OF MEAT

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Cold storage of meat refers to keeping meat at about 1 F. and at a humidity level of 80 to 2 percent.
2. Meat to be frozen should be held at temperatures below 3 F.
3. For quick freezing, meat should be exposed to temperatures of 4 to 5 F. below zero.
4. Where meat has been thawed after freezing, 6 are more likely to damage the meat, because they are able to penetrate the 7 cells.
5. The basic methods of curing meat are 8 curing and 9 curing.
6. The most important of the ingredients used in curing meat is 10 ; other ingredients include sugar, saltpeter, and sodium 11 salts.
7. For hams the length of the dry sugar cure is 12 days per inch (2.5 centimetres) of thickness.
8. The pressure method of box curing is used only in the cure of 13 .
9. When sugar is added to a sodium chloride brine, the resulting mixture is called a sweet 14 .
10. Pumping refers to the forcible introduction of 15 into a ham by means of a hand pump.

1. ________
2. ________
3. ________
4. ________
5. ________
6. ________
7. ________
8. ________
9. ________
10. ________
11. ________
12. ________
13. ________
14. ________
15. ________

UNIT E—MEAT AND FISH AS FOODS

TOPIC 4—BREEDS OF BEEF CATTLE

This topic, "Breeds of Beef Cattle," is planned to provide answers to the following questions:

- **What are the different breeds of beef cattle?**
- **What are the characteristics of each breed?**
- **Which breeds are the most popular?**

The history and background of cattle breeds are interesting and should be a part of the meatcutter's knowledge of meat. The Shorthorn, Hereford, and Angus are the most popular breeds of cattle. The Charolais, which is getting a great deal of attention now, should have a place of its own in the cattle industry as time goes on.

Shorthorn

The Shorthorn's native home is in the northeastern part of England. The breeding and improvement of these cattle took place in the Tees River area, from which came their early name of Teeswater; literally, "short-horned" cow.

The early Shorthorns were very large, wide-backed, well framed, deep in the forequarters, and mellow in handling. They had average milking qualities and a disposition to fatten. From the standpoint of beef-type breeds, the early Shorthorns were criticized. Their faults were lack of uniformity, prominence of hip and shoulder points, lack of length of rump, narrowness of floor chest, lack of fullness in the forerib, lack of flesh over the shoulder, paunchiness, long legs, fine hide, and failure to flesh evenly.

The Scots helped develop today's improved breed of Shorthorn. They produced in these cattle shorter legs, broad tops, thick flesh, greater feeding capacity, stronger constitution, earlier maturity, and a heavier coat of hair.

The Shorthorn breed is the most widely distributed and most numerous breed of beef cattle. Shorthorns are found in Great Britain, the United States, Canada, most countries in South America, Australia, New Zealand, South Africa, Mexico, and elsewhere. They were first brought to the United States in 1783 and to South America in 1836.

Modern Shorthorns are reds and roans of bright and dark shades. They are one of the largest breeds, being larger than the Hereford. The breed is mild tempered.

The Shorthorn carcass has good slope and has well-developed high-priced cuts. The meat has good marbling and fine texture. It is sometimes uneven in cover. It can sometimes have an excessive development of the brisket. Even though it lacks the natural flesh, smoothness, and marbling of the Angus, it still is favored by those who want an animal with a heavy carcass. It also is favored by consumers for its texture and quality.

Polled Shorthorn

The Polled Shorthorn is a breed that originated in Ohio, Indiana, Illinois, and Iowa. Work began on its development in 1870; until 1919 it was called Polled Durham. The new breed was developed by breeding Shorthorn bulls to native hornless heifers called "mulley" cows. In all characteristics it is the same as the Shorthorn except that it lacks horns.

Hereford

The native home of the Hereford is Herefordshire, England, which is a cattle and farming area. Since the early Herefords were used to pull plows, they were slaughtered only when old and no longer useful. They were not generally a uniform breed; they were uniform only in the herds of each owner. Work had to be done to make them uniform.

The breed is not distributed generally in England; it is found mostly just in the Herefordshire area. It has been distributed to Argentina, Uruguay, Brazil, Chile, the United States, Canada, Mexico, Australia, New Zealand, South Africa, British East Africa, Russia, and France.

The Hereford was first brought to the United States in 1817 and was inbred with Longhorn cattle because of the Hereford's qualities of good grazing, early maturity, compactness, more hair, heavy hides, and higher flesh. It could travel to market with less shrinkage and with fewer other problems.

The Hereford is strictly a beef breed. It is liked by the raisers of production cattle for its economy; it can produce high-quality flesh on an economical diet. The Hereford is very hardy in winter; losses to weather and disease are much less than with other breeds.

The Hereford is an animal with a mild disposition. This characteristic aids in easy fattening. Today's

Hereford has heavier hindquarters, is more compact, and is shorter-legged and heavier-fleshed. It is well known for its white face. When well fattened, the Hereford yields a thickly fleshed carcass lacking in trimness and smoothness. It is usually well finished. The texture of lean meat and marbling are good but not remarkable.

Angus

The area native to the Angus is northeastern Scotland in the counties of Aberdeen, Kincardine, and Forfar. Forfar was also known as Angus. The Angus, Galloway, and Highland breeds are thought to be of the same origin. Later, the breeding lines separated them. The Polled Angus was brought about by the introduction of Scandinavian polled stock.

The early Angus was threatened with near extinction by early breeders who crossed them with Shorthorns for beef stock of high quality and size. Other breeders had faith, though, and stayed with a pure breed.

The Angus is found in England, Ireland, the United States, Canada, Argentina, Australia, New Zealand, France, Denmark, and Germany. It was brought into the United States in 1873.

The modern Angus is one of the few cattle that are uniform in color; it is entirely black. It ranks third in size among beef cattle. The Angus has, on the average, a build that sets the lowest, is the most compact, and is the blockiest of all beef cattle. Its finish is also the smoothest and the most symmetrical.

The flesh of the Angus is one of the butcher's favorites. Almost all of its fat develops into marbling. It has an even, smooth fat cover and no extra rolls of fat. It carries a large amount of lean in the high-priced cuts, and it has a fine texture of grain.

Galloway

Galloway cattle were derived from a horned breed of the Galloway district of Scotland. How it came to be a polled breed is not known. After it was polled, the breeders were forced to breed to retain this preferred characteristic. It is a breed that was improved by selection, not by crossbreeding. It was preferred over its close relative, the Highland, because it lacked the wildness of the Highland.

The Galloway has been exported to Canada, the United States, England, Ireland, Russia, South Africa, Argentina, Mexico, Alaska, and the Philippine Islands. Prime users, though, are Scotland, Canada, and the United States.

The Galloway was first brought to the United States in 1870. In 1881, after the Angus had been a success, Galloway cattle were imported in large numbers, because they were similar to the Angus cattle and were cheaper.

Today's Galloway is black in color, polled, and smaller in size than the Angus. It is deep and low set, but in comparison with the Angus it is not so wide and compact. The neck is longer and the head is larger, narrower, and more rugged. The shoulders are frequently too heavy and prominent, the forerib is moderately arched, and back and loin are not as wide as those of the Angus. The hips are more prominent, and the thighs and twists are not as thick and full as those of the Angus. Their bones and joints are rugged and coarse. They are good grazers and feeders, they are a hardy breed, and they mature early. Their hides are in demand for robes and coats.

Highland

The Highland breed, also known as West Highland Kyloe, is native to western Scotland. It is a small, long-haired, rough-coated, long-horned cattle of the beef type that is able to withstand rough conditions. It is said to be the descendant of the black cattle of Britain.

The Highland has been exported to the United States, Canada, Argentina, Australia, and Russia. It has done quite well in Newfoundland and the Falkland Islands. Brought to the United States in 1883 to be bred with native cattle to make a hardy breed, the Highland never quite caught on. Cattle growers felt that sacrificing size to achieve hardiness was unnecessary.

Brahman or Zebu

The name Brahman, Brahma, or Zebu are names applied to the cattle of India. There are over 30 varieties or breeds, each of which has the name of the province in which it is raised. The Nellore, Origole, Guzerot, Gir, and Krishma varieties have been brought to the United States.

The cattle of India are characterized by a prominent hump above the shoulders; an abundance of loose, hanging skin under the throat; and a loose, hanging dewlap that often extends between the front legs and along the belly. These cattle are rather narrow of body, long-legged, and trim in the middle. They have muscling over the loins and have heavy hindquarters. The rump is short and drooping, although the best individual cattle are rather full and rounding.

It was difficult to bring these cattle to the United States. The cattle of India are considered sacred, and the Hindus do not believe in killing or eating these animals. Also, there was trouble with import restrictions in this country because of the diseases of India.

Indian cattle were first brought over in 1850 to Carolina, and later to Louisiana and Texas.

The Brahman has adapted well to the southern area of the United States. It is very disease-resistant and is immune to ticks, flies, and other such insects. Much crossbreeding is being done with these animals. One product is a Shorthorn-Brahman mix known as the Santa Gertrudis, which produces maximum size, hardiness, ability to fatten, highest dressing percentage, resistance to heat and insects, and near elimination of the hump.

Charolais

The Charolais is a breed of cattle that is gaining prominence with breeders. It is a large French breed that is being used for crossbreeding with Herefords, Angus, and Shorthorns. In recent years crossbreeds have been winning many of the carcass competitions in the large fairs across the nation. They have a high yield, some dressing in the 60 to 66 percent range, and they have yield grades in the 1's and in the 50 to 54 percent range. They also show fine marbling with little extra waste. They are good for the producer because of rapid, efficient gains. Retailers like them because of their proportion of high-quality lean meat to waste fat. Customers like the look of lean, bright red beef, and their families like the flavor and tenderness of the meat.

Other Breeds

Some breeds of cattle are referred to as dual-purpose breeds; that is, they are intended for use as dairy cattle and as beef cattle.

The Dexter is an Irish breed of small size that is a result of inbreeding that caused dwarfed "freaks of nature." It is the smallest breed of cattle. Bulls weigh only 900 pounds (405 kilograms) and cows not more than 800 pounds (360 kilograms); they stand only about 40 inches (102 centimetres) high. They are compact and low set, and they serve a dual purpose well. The poor of Ireland use the cows for milk and the male calves for meat.

The Red Polled of England is also a dual-purpose animal. It is an inconsistent breed. It can be used as a milk cow or as a beef cattle. The Red Polled is not exceptional in either category, but it does dress well. Only a few cattle of this type are found in the United States today.

The milking Shorthorn can be used also for beef but does not have the qualities of its relative, the Shorthorn. It is large in size but is taller and rangier than its beef relatives. Recently, new interest has been stirred in this breed, and some better beef herds have resulted.

The Devon, a native of England, is another dual-purpose breed. Very little is known of its origin. It could have come from Britain, France, Spain, or Flanders. The Devon is thought to be related to the Sussex and the Hereford. It is used to some extent in California for beef. It is of medium size and has a fairly good carcass.

The Murray Grey, a breed new to the United States, was developed in Australia. It is a cross of Shorthorn and Angus.

New Breeds

Most of the new breeds are large in stature (Table E-2). This may tend to hold them back because the cuts of meat would be too large for the present market demand. As food becomes more and more in demand, this could change.

To the Instructor

You could have your students check with the U.S. Department of Agriculture for more information on the new breeds. Ask students to give their opinions of the future for these breeds.

TABLE E-2
Breeds of Beef Cattle

Breed	*Country of origin*	*Approximate date of development*	*Date introduced to North America*	*Approximate mature male size*	*Predominant color*
Barzona	U.S.	1955	1955	Large	Light, medium red
Beef Friesian	Netherlands	1700	1971	Large	Black and white
Beefalo	U.S.	1950	1950	Medium	Brown
Beefmaster	U.S.	1931	1931	Large	Red
Blonde d'Aquitaine	France	1800	1971	Large	Yellow-gold
Brangus	U.S.	1912	1912	Medium	Black
Chianina	Italy	Pre-Roman	1970	Large	Off-white
Gelbvieh	Germany	Unknown	1972	Large	Golden red
Hays Converter	Canada	1952	1952	Large	Black-white face
Illawarra	Australia	1830	1975	Medium	Red/red-white
Limousin	France	Unknown	1968	Large	Red-gold
Maine-Anjou	France	1840	1969	Large	Dark red
Marchigiana	Italy	400	1972	Large	Grayish white
MRI	Netherlands	Unknown	1974	Large	Red on white
Normande	France	800	1888	Large	Dark red-white
Norwegian Red	Norway	Unknown	1973	Medium	Red and white
Pinzgauer	Austria	500	1972	Large	Chestnut-white
Red Angus	U.S.	1940	Unknown	Medium	Red
Red Brangus	U.S.	1940	1940	Large	Red
Romagnola	Italy	Unknown	1970	Large	Grey
Salers	France	1840	1973	Medium	Cherry red
Scotch Highland	Scotland	1100	1920	Small	Yellow-red-black-silver
Simmental	Switzerland	Unknown	1970	Large	Yellow-red
South Devon	England	Unknown	1970	Large	Yellow-red
Tarentaise	France	1859	1972	Small	Light, red-dark blend

UNIT E—MEAT AND FISH AS FOODS

TOPIC 4—BREEDS OF BEEF CATTLE

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The meat of Shorthorn cattle has good marbling and fine texture but is sometimes uneven in _1_ and sometimes has an excessive development of the _2_.
   1. ________
   2. ________
2. In comparison with its former characteristics, today's Hereford has heavier _3_ and shorter _4_.
   3. ________
   4. ________
3. When it is well fattened, the Hereford yields a thickly fleshed carcass that is lacking in _5_ and _6_.
   5. ________
   6. ________
4. Of all beef cattle, the Angus has the _7_ and most symmetrical _8_.
   7. ________
   8. ________
5. Butchers find the Angus satisfactory because of its good _9_ and even, smooth _10_ cover.
   9. ________
   10. ________
6. The Angus has a large amount of _11_ meat in its high-priced cuts and a fine _12_ of grain.
   11. ________
   12. ________
7. Galloway cattle were brought to America, because they resembled _13_ cattle and because they were _14_ in cost.
   13. ________
   14. ________
8. Brahman cattle from India have been crossbred with Shorthorn cattle to produce the breed known as _15_ _16_.
   15. ________
   16. ________
9. Butchers like Charolais cattle, because these cattle have a high proportion of _17_ meat to waste _18_.
   17. ________
   18. ________
10. Among other breeds of cattle, the Dexter is an Irish breed known for its _19_ size; the Devon is an English breed identified as a _20_-purpose breed.
   19. ________
   20. ________

TOPIC 5—FISH

This topic, "Fish," is planned to provide answers to the following questions:

- **What are the principal forms in which fish are marketed?**
- **What are the characteristics of the different forms of fish?**
- **How does the nutritional value of fish compare with that of meat?**
- **How are federal standardization, inspection, and certification of fishery products carried out?**

Nutritive Value of Fish

Fish is an important protein food and as such should play an important role in meal planning. Fish are included in the "Daily Food Guide" along with meat, poultry, and cheese. These foods provide the high-quality protein that is essential for growth and repair of body tissue.

Proteins

The proteins in our foods are composed of even smaller units known as amino acids. It is through amino acid activity that proteins function. Some amino acids can be synthesized within our bodies from materials in other foods; however, there are other amino acids that our bodies cannot manufacture. These are called essential amino acids and are contained in good quantity in all fish protein. Children need this biologically balanced or complete protein to keep pace with their rapidly developing bodies. Adults need it to maintain health and well-being. Fish protein contains little or no connective tissue and therefore is very easily digested and assimilated by the body. This fact makes it especially valuable in diets for children, older people, and convalescents.

Vitamins

By a fortunate coincidence, protein foods also contain vitamins and minerals. Fishery products contain useful amounts of the B complex vitamins, which include thiamin, riboflavin, niacin, vitamin B_6, vitamin B_{12}, and pantothenic acid. These vitamins are needed by the body to maintain healthy nerve tissues and to support the energy-yielding processes of the body.

Minerals

Minerals are essential for certain functions of the body, particularly the maintenance of sound teeth and bones. Fish are a good source of calcium, iron, potassium, phosphorus, copper, iodine, manganese, cobalt, and other trace minerals. The flesh of both salt-water and fresh-water fish is quite low in sodium content, making it particularly adaptable for strict, low sodium diets.

Fats

Of interest to dieters is the fact that fish are high in protein but low in calories. The fat content of the different species varies widely. It may be less than 1 percent for fish of the cod family or as much as 20 to 25 percent for salmon or mackerel. When fish are cooked by means other than frying, and served without the addition of rich sauces, they tend to be low in calories.

Buying Fish

The amount of fish to buy per serving varies with the recipe to be used, the size of the serving, and the amount of bone in the fish. A serving is approximately 3 ounces (85 grams) of cooked, boneless fish.

The following table can help you decide how much fish to buy per serving:

Whole	12 ounces (336 grams)
Dressed or pan-dressed	8 ounces (224 grams)
Fillets or steaks	5 ounces (140 grams)
Portions	5 ounces (140 grams)
Sticks	4 ounces (112 grams)
Canned	3 ounces (85 grams)

Number of Fish Caught

Of the many species of fish caught each year in the United States, relatively few are known to the public. In California alone more than 60 species are represented in the approximately 625 million pounds (281 million kilograms) of fish caught each year.

In 1978 some 89.6 percent of the catch of fish in the United States was used for human food. The remainder was used for industrial purposes. California led in the amount of fish caught—primarily tuna, mackerel, and sardines. For the country as a whole, shrimp was the most valuable catch, followed by salmon and tuna. On the average, the American fishing fleet takes 4 percent of the world's catch of fish.

Principal Forms

The principal forms in which fish are marketed are fresh, frozen, canned, and smoked. Approximately 48.6 percent of the fish used for human food in the United States in 1978 was sold fresh or frozen; 37.8 percent was canned; 3.2 percent was smoked, salted, or otherwise preserved.

Importance of Fish

The United States ranks sixth in the world in the amount of fish (seafood) sold, after Japan, Russia, China, Peru, and Norway. Sales of fishery products in the United States approach $2 billion a year. Thus, fishing is very important to the American economy and diet.

Seafood is rich in protein. Its fats are more polyunsaturated than animal fats and most vegetable fats. Seafood is sold in the United States in fresh, frozen, canned, and processed forms. Besides the 20 more important types of fish found in the Pacific Ocean from Baja California to the Aleutian Islands, such shellfish as dungeness and king crab, spiny lobster, clam, abalone, oysters, and shrimp also are found.

Market Forms

The edible portion of fish varies from 45 percent for whole fish to 100 percent for fillets. The different market forms of fish are as follows:

Whole or round—Fish as they come from the water are 45 percent edible.

Drawn—Whole eviscerated fish are 48 percent edible.

Dressed or pan-dressed—Whole fish with the scales, entrails, head, tail, and fins removed are 67 percent edible.

Steaks—Cross-section slices from dressed fish are 84 percent edible.

Fillets—Sides of fish cut lengthwise from the backbone and practically boneless are 100 percent edible.

Butterfly fillets—Two sides of the fish are held together by uncut flesh and the skin of the belly.

Fish sticks—Elongated pieces of fish are cut from blocks of frozen fillet, each stick weighing approximately 1 ounce (28 grams).

Portions—Uniformly shaped pieces of boneless fish are cut from blocks of frozen fillets. A portion has a thickness of ⅜ inch (0.9 centimetre) or more and is much larger than a fish stick.

The market forms of shellfish are as follows:

In shell—Hard and soft blue crabs, lobsters, clams, and oysters should be alive if bought fresh in the shell. Crab and lobster can be bought cooked in the shell.

Shucked—When the shells are removed, clams, oysters, and scallops are completely edible.

Headless—Usually only the tail part of shrimp is marketed. Spiny lobster tails, which are also a common market form, are about 85 percent edible.

Cooked meats—Crab, shrimp, and lobster meats often are marketed in this form.

Fresh fish have the following characteristics:

1. Flesh—Firm, elastic flesh, not separating from the bones
2. Odor—Fresh and mild
3. Eyes—Bright, clear, and full
4. Gills—Red and free from slime
5. Skin—Shiny, with color unfaded

Fresh fish fillets and steaks have the following characteristics:

1. Flesh—Firm, elastic flesh without drying and browning about the edges
2. Odor—Fresh and mild

Frozen Fish

High-quality frozen fish that is properly processed, packaged, and held at 0° F. (-18° C) or below will remain in good condition for a long time. Frozen fish should be solid when bought. There should be no discoloration or brownish tinge in the flesh.

Fishery products that are sold in the frozen form usually are packed during seasons of abundance and held in cold storage until ready for distribution. Thus, the consumer is given the opportunity to select different species of fish throughout the year. High-quality frozen fish that are properly processed will remain in good condition for a long time. Frozen fish may be purchased in any of the following market forms: whole, dressed, steaks, fillets, chunks, portions, and sticks.

Frozen fish of good quality have the following characteristics:

1. Flesh—Should be solidly frozen when bought. The flesh should have no discoloration or freezer burn. Virtually all deterioration in quality is prevented when fish are properly held in the frozen state. Frozen fish which have been thawed and then refrozen are poorer in quality.
2. Odor—Frozen fish should have little or no odor. A strong fish odor means poor quality.
3. Wrapping—Most frozen fillets, steaks, chunks, portions, and sticks are wrapped either individually or in packages of various weights. The wrapping should be of moisture-vapor-proof material. There should be little or no air space between the fish and the wrapping.

Shellfish

The various kinds of shellfish are described as follows:

Shrimp

Fresh, whole (head on)—Mainly used near production points

Fresh or frozen, headless, but with shells on—85 percent edible

Fresh or frozen, cooked—Generally peeled (shell removed and meat deveined)

Frozen, breaded (raw or cooked)—Breaded after being peeled and deveined (When cooked, shell turns red.)

Green—Shrimp that has not been cooked

NOTE: Shrimp is sold according to size, the larger sizes being the most expensive.

Clams and oysters in the shell—Clams and oysters should be alive, and the shell should close tight when tapped gently.

Fresh clams—Clams should be pale orange to deep orange in color and have no stale odor or taste. Fresh shucked clams are packed in little or no liquid.

Shucked oysters—Oysters should be plump and have a natural creamy color with clear liquid. There should be no more than 10 percent liquid by weight. Oysters with an excessive amount of liquid are probably poor in quality. Oysters are sold according to size, the larger ones being the most expensive. Excessive water results in bloating of oyster meat.

Crabs and Lobsters

Crabs, lobsters, and spiny lobsters should show movement of legs when alive. The tail of a live lobster curls under the body and does not hang down when the lobster is picked up. Frozen spiny-lobster or rock-lobster tails should have clear white meat, be hard frozen, and have no odor. They are 85 percent edible.

Cooked crab and lobster should be bright red and free from any disagreeable odor. The five varieties of crab are:

1. Blue crabs—The meat is packed as
   a. Lump meat—Whole lumps of white meat from the large body muscle
   b. Flake meat—Small pieces of white meat from the body
   c. Flake and lump—A combination of the two kinds of meat
   d. Claw meat—Brownish-tinted meat from the claws
2. Rock crabs—New England rock crab meat is marketed in one grade and is brownish in color.
3. Dungeness crabs—Pacific Coast dungeness crab meat comes from body and claws. Claw meat is slightly red; body meat is white. Dungeness crabs are sold eviscerated and as they come from the water.
4. King crabs—The meat of the Alaskan king crab is leg meat and is marketed frozen. Cooked meat has a pink or red tint. Entire leg sections are marketed cooked and frozen.
5. Soft crabs—These are Atlantic Coast blue crabs that have shed their hard shells. They should be alive when fresh; otherwise they are frozen.

Scallops

The large abductor muscle of the scallop that controls shell movement is the part that is marketed. Large sea scallop meat is white, orange, or pink; the small bay scallop meat is creamy white, light tan, or pinkish. Scallops should have a sweet odor before they are cooked, and packaged scallops should be practically free of liquid.

Preservation of Fish

Fresh fish and frozen fish require different means of preservation.

Fresh Fish

For good storage life and the best of quality, a temperature of 30° to 32° F. (-1° to 0° C) is recommended for fresh fish. Ice is an excellent preservative for fresh fish because it keeps the temperature low and the fish moist. Smoked fish should, however, be kept from direct contact with ice. Packaging of fresh fish should be done one day ahead of sales. The fish should be well iced. and the refrigerator doors should be closed tightly.

Frozen Fish

Chemical and physical changes that take place during frozen storage cause fish to lose their quality and eventually become unfit for sale. The flesh gradually becomes tough and dries out, leaving the product unpalatable. The fatty species of fish may turn rancid. Deliveries of fish should be accepted quickly and taken directly to the freezer. Storage should be at the recommended temperature of 15° F. (-9° C) or colder. The product should be inspected, and any thawed or partially thawed product should be rejected. Freezer cabinets should be stocked quickly, and the stock should be rotated. If thawing should occur, the fish should be sold as defrosted fish.

Fish caught in periods of peak production are often sold frozen, thus becoming available to consumers at any time of the year. They are considered the equal of fresh fish in flavor, food value, and appearance. They may be used interchangeably with fresh fish. The increase in availability of frozen fish has made possible the marketing and eating of fish in areas many miles from the point of catch and many days after the catch. One of the most popular of the frozen forms is fish sticks, a relatively new item.

Thawing Frozen Fish

Frozen fish should be thawed as follows:

1. Schedule thawing so that the fish will be cooked soon after it is thawed. Do not hold thawed fish longer than a day before cooking.
2. Place the individual packages in the refrigerator to thaw. Allow 24 hours for thawing a 1-pound (0.5 kilogram) package.
3. If quicker thawing is necessary, place the individual packages under cold running water to thaw. Allow 1 to 2 hours for thawing a 1-pound (0.5 kilogram) package.
4. Do not thaw fish at room temperature or in warm water.
5. Do not refreeze.
6. Fish portions and sticks should not be thawed before cooking.
7. Frozen fillets and steaks may be cooked without thawing if additional cooking time is allowed. Fillets or steaks to be breaded or stuffed should be thawed.

Per Capita Consumption

In 1977 the average per capita consumption of fish in the United States was 13 pounds (6 kilograms). Fish products rank high in nutritive value. Their protein content is rated as sufficient to supply—in a normal serving—enough for a person's daily requirement of animal protein. The protein content is not easily affected by the usual cooking methods. Fish contains approximately the same minerals as does beef. An added advantage of fish is that it also supplies iodine. Shellfish are especially rich in minerals.

Fish and a few other foods are often referred to by food faddists as brain food. There is no basis for this claim. In fact, no such thing as brain food exists. However, as mentioned previously, fish is a particularly good source of high-quality protein. When it is included in a balanced diet, it provides nourishment to all body tissues and shows no special preference for any particular part of the body.

For many centuries, seafood has been considered to be easily digestible. Recent research has shown that 90 to 100 percent of fish protein is digestible. The digestibility of the protein in finfish and shellfish is considered to be slightly higher than that of beef and chicken.

The nutritional value of fish is shown in Table E-3.

How to Cook Fish

Aside from its nutritional value, seafood has little waste and requires very little cooking time. It may easily be substituted in casseroles, main dishes, and sandwich fillings; it has no specific season. A few tips for cooking fish are provided in this section.

Baking

Baking is a form of dry heat cooking and is one of the easiest ways to cook fish. The most important guide to follow in fish cookery is to "bake fish easy." Fish should be baked in a preheated, moderate oven set at 350° F. (177° C) for a relatively short period of time. This keeps the moistness and flavor in the fish, prevents drying, and keeps the fish tender and palatable. Fish should be baked in a sauce or basted with melted fat or oil to keep the surface moist.

Broiling

Broiling, like baking, is a dry heat method of cookery; but in broiling the heat is direct, intense, and comes from only one source. Thin foods tend to dry out under the broiler, so when planning to use this method, the cook should choose pan-dressed fish, fillets, or steaks that are about 1 inch (2.5 centimetres) thick. If frozen, the fish should be thawed. The fish should be basted well with melted fat or oil or a basting sauce before it is placed under the broiler. To keep the fish moist, it should be basted again while broiling.

The cook should follow the range manufacturer's directions for the operation and preheating of the broiler. The length of time it takes to broil fish depends on the thickness and the distance between the fish and the source of heat. The surface of the fish should be about 3 to 4 inches (8 to 10 centimetres) from the source of heat; and thicker cuts should be farther from the heat than the thin ones.

Cooking time usually will range from 10 to 15 minutes to reach the "fish flake easily" stage. As a rule, the fish do not need to be turned because the heat of the pan will cook the underside adequately. The thicker pieces should be turned half way through the allotted cooking time. They should then be basted again with fat or sauce. Broiled fish should be served sizzling hot.

Charcoal Broiling

Charcoal broiling is a dry heat method of cooking over hot coals and in recent years has become a popular form of recreation. Fish, because they cook so quickly, are a natural for this method of cookery.

Pan-dressed fish, fillets, and steaks all are suitable for charcoal broiling. If frozen, the fish should be thawed in advance. Because fish flake easily as their cooking nears completion, the use of a well-greased, long-handled, hinged wire grill is recommended.

Since charcoal broiling is a dry heat process, the thicker cuts of fish are preferable because they tend to dry out less during the cooking process than

TABLE E-3
Nutritional Value of Fish

Raw edible portion, 3 ounces (85 grams)	Protein, percent	Fat, percent	Calories per 3½ ounces (100 grams)	Sodium, milligrams
Finfish				
Catfish	17.6	5.2	157	60
Cod	17.4	0.5	74	90
Croaker	18.5	2.5	98	72
Flounder	18.1	1.4	88	121
Greenland turbot	16.9	3.5	99	*
Grouper	20.1	1.0	89	83
Haddock	18.2	0.5	77	98
Halibut	18.7	4.3	119	156
Lake trout	17.2	11.1	169	24
Mackerel	19.5	9.9	106	33
Mullet	20.1	4.6	122	70
Ocean perch	14.9	0.7	91	*
Pollock	19.7	1.3	91	*
Rainbow trout	20.7	6.8	154	52
Salmon	19.9	9.3	163	76
Sea bass	19.1	1.6	90	67
Sea herring	17.7	2.8	128	105
Sea trout	17.7	3.8	123	38
Smelt	17.0	1.4	86	80
Snapper	19.4	1.1	88	90
Sole	16.9	1.4	83	93
Tuna	24.7	5.1	168	63
Whitefish	18.6	5.2	121	53
Whiting	18.9	1.3	90	50
Yellow perch	18.8	1.1	85	67
Shellfish				
Clams	11.0	1.7	63	253
Crab	15.7	2.7	81	330
Lobster	18.1	1.4	98	296
Mussels	11.9	1.4	98	296
Oysters	8.5	1.8	68	386
Scallop	14.6	0.7	78	163
Shrimp	18.6	1.6	209	133
Squid	17.1	1.0	84	158

*Data are unavailable.

do the thin ones. Also, to ensure serving juicy and flavorful fish, a sauce that contains some fat should be used and the fish should be basted generously before and during the cooking process.

Fish usually are cooked about 4 inches (10 centimetres) from moderately hot coals for 10 to 20 minutes, depending on the thickness of the fish.

Frying

Frying is a method of cooking food in fat. The fat selected for frying should be one that can be heated to a high temperature without danger of smoking. This is necessary because smoking fat may decompose and give the food an unpleasant flavor. Because they begin smoking at higher temperatures, vegetable oils and fats are preferable to fats of animal origin.

The temperature of the fat is extremely important. Heat that is too high will brown the outside of the fish before the centers are cooked. Heat that is too low will produce a pale, greasy, fat-soaked product. The most satisfactory frying temperature for fish is 350° F. (177° C).

Frozen fish must be thawed before frying. When the fish is thawed, the pieces should be separated and cut to uniform size.

After frying, the fish should be drained immediately on absorbent paper to remove excessive fat. The fish should be kept warm in a low oven until all pieces are cooked.

Deep-Fat Frying

Deep fat frying is a term applied to cooking in a deep layer of fat. It is a quick method of cooking and is an excellent way to cook tender foods or precooked foods.

For deep-fat frying you need a heavy, deep saucepan or French fryer with straight sides, a fry basket to fit the fryer, a deep-fat frying thermometer, or an electric fryer with automatic temperature control. Enough fat to float the fish should be used, but the fryer should not be more than half full. Space must be allowed for the fish and for the bubbling fat.

The fish may be dipped in a liquid and coated with a breading or dipped in batter. The coating will keep the fish moist during frying and will give them a delicious crispness.

Only one layer of fish at a time should be placed in the fry basket, and enough room should be allowed so that the pieces do not touch. This prevents the temperature of the fat from dropping suddenly and assures thorough cooking and even browning. When the fat has heated to the proper temperature, lower the basket into the fryer slowly to prevent excessive bubbling. If the fat is at the right temperature when the fish are added, a crust forms almost immediately, holding in the juices and at the same time preventing the fat from soaking in. Fry until the fish are golden brown and flake easily, usually about 3 to 5 minutes.

Pan-Frying

Pan-frying is a term applied to cooking in a small amount of fat in a fry pan. Of all the ways of cooking fish, pan-frying is probably the most frequently used—and most frequently abused—method. When well controlled, it is an excellent way of cooking pan-dressed fish, fillets, and steaks.

The general procedure is to dip the fish in a liquid and then coat them with a breading. Heat about ⅛ inch (0.3 centimetre) of fat in the bottom of a heavy fry pan. For pans with a temperature control, the correct heat is 350° F. (177° C). Place one layer of breaded fish in the hot fat, taking care not to overload the pan and thus cool the fat. Fry until brown on one side, then turn and brown the other side. Cooking time will vary with the thickness of the fish. In general, allow about 8 to 10 minutes.

Oven-Frying

Oven-frying is not actually a true frying method. It is a hot oven method which simulates fried fish. This method of cooking fish was developed by Evelene Spencer, a home economist, and is sometimes referred to as the Spencer method.

For oven-frying, the fish are cut into serving-size portions, dipped in salted milk, and coated with toasted, fine, dry crumbs. The fish are then placed in a shallow, well-greased baking pan. A little melted fat or oil is poured over the fish, and they are baked in an extremely hot oven (500° F. or 260° C). The nice features of oven-frying are that the fish do not require turning, basting, or careful watching; and the cooking time is short, usually 10 to 15 minutes. The crumb coating and the high temperature prevent the escape of flavorful juices and give an attractive, brown crust.

Poaching

Poaching is a method of cooking in a simmering liquid. In poaching, the fish are placed in a single layer in a shallow, wide pan, such as a large fry pan, and barely covered with liquid. The liquid used in poaching may be lightly salted water, water seasoned with spices and herbs, milk, or a mixture of white wine and water. As with other methods of fish cookery, it is important not to overcook the fish. Simmer the fish in the liquid in a covered pan just until the fish can be flaked easily, usually 5 to 10 minutes. Because the poaching liquid contains flavorful juices, the liquid is often reduced and thickened to make a sauce for the fish.

Poaching is a favorite method of cooking fish—and with good reason. As an entree, poached fish can be served with a sauce or used as the main ingredient of a casserole or other combination dish. When it is chilled and flaked, poached fish is delicious as a salad.

Steaming

Steaming is a method of cooking fish by means of the steam generated from boiling water. When cooked over moisture in a tightly covered pan, the fish retain their natural juices and flavors. A steam cooker is ideal, but any deep pan with a tight cover is satisfactory. If a steaming rack is not available, anything may be used that prevents the fish from touching the water. The water used for steaming may be plain or seasoned with various spices, herbs, or wine. When the water boils rapidly, the fish are placed on the rack, the pan is covered tightly, and the fish are steamed for 5 to 10 minutes or until they flake easily when tested with a fork. Steamed fish may be served the same as poached fish.

Federal Inspection

Fishery products are voluntarily inspected. Beef and poultry, as well as many other perishable food items are federally inspected and graded at various stages of processing to ensure that the consumer receives a safe, wholesome, acceptable quality product. There is no similar mandatory federal inspection program for fish. Most fish suppliers have great pride in their products and consistently turn out high-quality products. To supplement these efforts, the U.S. Department of the Interior, in 1958, began a voluntary program for standardization, inspection, and certification of fishery products. The program consists of (1) the development of standards for grades of fishery products; and (2) voluntary inspection and certification of those products. Priority of development is based on industry requests. In October, 1970, the U.S. Department of Commerce (USDC) took over this voluntary inspection in the place of the Department of the Interior. The program is voluntarily subscribed to by processors, packers, brokers, and seafood users interested in having USDC inspect their products.

Inspection service users pay fees to have USDC inspectors evaluate the raw materials, ensure the hygienic preparation of the products, and certify final product quality and condition. The USDC inspectors function as objective observers in evaluating the processing techniques and product quality and condition. Products packed in plants under USDC inspection can carry labels for easy consumer identification.

In the voluntary inspection and certification, either lot or continuous inspection is provided.

Lot Inspection

Under lot inspection, which may be requested by any interested person, checking may be done on the basis of (1) U.S. standards for grades; (2) federal, state, or other official specifications; or (3) written specifications on the buyer and seller contract. An appropriate certificate of quality and condition is issued on the basis of these findings.

Continuous Inspection

Continuous inspection is conducted on a full-time basis within the processing plant. The product must conform to U.S. grade standards or to approved plant specifications, and plant processing lines and personnel must meet certain basic sanitary requirements. Under continuous inspection, products that have been inspected under U.S. grade standards are entitled to carry a federal grade or continuous inspection shield on the label. Those that were inspected in accordance with approved plant specifications may bear a federal shield on the label to indicate that they were packed under continuous inspection.

Research Projects

Just as the U.S. Department of Agriculture and state agencies have sought means to help farmers improve their production of crops, so the U.S. Department of Commerce and certain state agencies have been charged with helping the fish industry. Their assistance has been in the form of research into handling, such as studying the possibility of using radiopasteurization to lengthen the storage life of fish products held at 32° F. (0° C); research into the migration patterns of fish, illustrated by the tagging of various species; and research into locating new beds of commercial fish, such as the study of shrimp and shrimp-like crustaceans in midwater and deep-water ocean areas. Many recent developments have come about as a result of such research.

UNIT E—MEAT AND FISH AS FOODS

TOPIC 5—FISH

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. In California more than 1 species of fish are caught each year.

1. ________

2. The principal forms in which fish are marketed are fresh, 2 3, and 4.

2. ________
3. ________
4. ________

3. The United States ranks 5 among the nations of the world in the amount of fish sold; annual sales of fish amount to about 6 billion dollars a year.

5. ________
6. ________

4. Besides being rich in protein, fish contains fats that are more 7 than animal fats and most vegetable fats.

7. ________

5. Whole fish that have been eviscerated are known as 8 fish.

8. ________

6. Cross-sectional slices of dressed fish are known as fish 9.

9. ________

7. Elongated pieces of fish cut from blocks of frozen fillet are called fish 10.

10. ________

8. Shucked oysters should be 11 in appearance and have a natural 12 color with clear liquid.

11. ________
12. ________

9. Dungeness crabs, which are sold eviscerated and as they come from the water, have claw meat that is slightly 13 and body meat that is 14.

13. ________
14. ________

10. In the voluntary inspection of fish products, either lot or 15 inspection is provided.

15. ________

UNIT F MEAT FROM FARM TO TABLE

TOPIC 1—SUPPLY OF MEAT

This topic, "Supply of Meat," is planned to provide answers to the following questions:

- **What are the characteristics of the price cycle of meat?**
- **Why is California called a "cattle-deficit area"?**
- **What kind of meat is most popular with the American consumer?**
- **What is the meaning of the "hog-corn price ratio"?**
- **What trends are evident in the production of poultry?**

Meat prices are generally highest in July and August. Prices go down in September, reach a low in January, and begin to rise again in February to their peak in July or August. There are exceptional years, however. The large supply of hogs that are marketed by the large Midwest hog raisers is a factor in the price cycle, as is the extra supply of beef marketed by the beef raisers. The turkey growers add another factor with their plentiful supply of holiday turkeys, and the consumer makes an impact when he or she follows tradition and buys turkey for the holiday seasons.

Meat Consumption

Agricultural economists are agreed that meat is the most important item in the food budget of the average American consumer. From a nutrition standpoint approximately two-thirds of the consumer's protein and two-fifths of his or her caloric intake come from animal products and dairy products as well as meat. However, these are only averages. The actual consumption of meat fluctuates according to comparative prices, the economic status of the population, and other variables. In spite of these factors, however, certain trends in meat purchases can be ascertained. They are presented in this topic to give the apprentice meatcutter a better idea of what he or she may expect in consumer demands.

Today's Consumer

In general, the American consumer is eating a more varied diet than he or she did in the years before World War II. The consumer eats more out-of-season fruits and vegetables, more eggs, more dairy products, and more meat. At the same time he or she is eating smaller amounts of potatoes, cereal, and beans.

The change to a more expensive diet follows closely the rise in economic status of the average American. Economics alone, however, does not account for the shift. As more work is done by machines and less physical effort is required of the worker, he or she has less need for a diet rich in calories. For example, the American consumers have been increasing their demand for lean pork.

Beef Consumption

The sale of beef cattle supplies approximately 18 percent of annual farm income. This amount is larger than that produced by any other single farm enterprise. Nearly every state contributes to this supply, although the range areas of the western states raise primarily feeder cattle and the corn-belt states specialize in feeding them out. California is identified as a "cattle-deficit area," because its rapidly growing population has outstripped the increase in its livestock production. For 1961 the number of cattle and calves imported into the state was 61 percent of the number slaughtered within the state under state and federal inspection; sheep and lambs, 59 percent; and hogs, 80 percent. The only meat that California exports in large quantities is turkey. By 1969 the deficit had increased to 71.5 percent for beef, 60.6 percent for lamb, and 92.3 percent for pork.

Comparison with pork. The relationship between the demand for pork and the demand for beef is striking. At certain times the public appears to prefer pork; at other times, beef. As a whole the consumer purchases the meat that he or she considers the better buy. A study of the amount of beef purchased over the years reveals, however, that people tend to prefer it to all other meats. The fluctuations in pounds of beef consumed have not been as great as have been the fluctuations in price. Between 1948 and 1957 the average annual beef consumption per person fluctuated between 56 and 85 pounds (25 and 38 kilograms). In 1960 beef comprised 38 percent of all meat sold, a 2 percent increase over 1959.

In 1968 the per capita consumption of beef was 114 pounds (51 kilograms); pork, 66 pounds (30 kilograms); lamb and mutton, 3 pounds (1.4 kilograms); and poultry, 44 pounds (20 kilograms). Total per capita consumption of meat and poultry was 227 pounds (102 kilograms). In 1976 the per capita consumption for beef, pork, veal, lamb, chicken, and turkey was 204 pounds (92 kilograms). (See chart in *The Meat We Eat*, page 11.) The consumption varies from year to year, depending on the many variables involved.

Effect of income. Evidence points to the fact that people tend to eat more beef, particularly more expensive cuts, when economic conditions are good. When incomes are high, better quality prime rib roasts and steaks are in greater demand. Thus the price spread between the high grades and low grades of beef increases. When incomes drop, however, the consumer returns to the lower-priced cuts, and the price spread decreases.

Importance of research. Like the production of most other animal and plant foods, cattle production has become more efficient in recent years. Research in breeding, feeding, and managing herds has led to the production of more pounds of meat for less feed consumed.

Agricultural economists agree that, with the ever-expanding population, the demand for beef will increase. They caution producers that they must develop still more ways in which to produce more beef per acre of land at a profit and supply beef to the consumer at a price he or she can pay.

The leading cattle-producing states are Texas, Iowa, Nebraska, Kansas, and Oklahoma; California ranks seventh. Production of calves is included in these rankings.

Pork Consumption

Pork production is tied closely to corn production. For this reason the leading hog-producing states are the six that comprise the Corn Belt: Iowa, Illinois, Indiana, Missouri, Minnesota, and Ohio.

Hog-corn price ratio. In any discussion of pork production, mention is made of the hog-corn price ratio, which is simply the relationship based on the number of bushels of corn that can be purchased for the price of 100 pounds (45 kilograms) of pork. In other words, by determining this ratio, the producer can decide whether hog production will be profitable. The usual break-even figure for this ratio is considered to be 13.5 to 1, which means that the sale of 100 pounds (45 kilograms) of live hog should bring the price of 13.5 bushels of corn.

The hog-corn price ratio is particularly important to the producer. Corn is the basic feed for hogs, and hog production is an enterprise that is relatively easy to enter. The expenditure for swine and the equipment for raising it are much smaller than that for many other crops. Therefore, when the hog-corn price ratio appears favorable, many farmers rush into the production of hogs. The action of these farmers may tend to force the market price down.

Lean hogs. As mentioned previously, the major trend in pork production in recent years has been toward lean hogs. This trend has been brought about by the decreased demand for fatty foods, by the decline in the use of animal fats in soapmaking, and by the substitution of vegetable oils for lard in cooking.

Although the demand for pork is influenced by its cost, a study of the consumption of meat per person shows that pork consumption has not changed very much in this century. From 1900 to the present time, pork consumed per person in the United States has remained very close to 66 pounds (30 kilograms) annually. The leading hog-producing states are Iowa, Illinois, Missouri, Indiana, and Minnesota.

Lamb Consumption

In contrast with most other meats, the consumption of lamb has declined since the turn of the century. California is located in one of the principal lamb-consumption areas, and in the late 1950s the state was purchasing approximately 21 percent of the total amount of lamb marketed. A reason for this large consumption is, perhaps, the large demand for lamb by the cosmopolitan populations of San Francisco and Los Angeles. Surveys have shown that lamb consumption is particularly high among those who prefer kosher meats and among those from eastern Mediterranean countries. Both of these groups are well represented in the cities.

In 1976 the per capita consumption of lamb in the United States dropped to less than 2 pounds (0.9 kilogram), which is almost 4 pounds (1.8 kilograms) less than was eaten before the start of World War II. Surveys have shown that one of the biggest reasons for this decline is the average customer's feeling that he or she does not know how to prepare and serve lamb. Thus, the meatcutter is faced with the need to acquaint the consumer with the various cuts of lamb and with the methods of cooking and serving them.

Poultry Consumption

The trend in poultry production is toward larger flocks but a smaller number of producers. California is among the nation's leading poultry-producing states. One of the newer phases of the chicken industry is the production of broilers (chickens about nine to 12 weeks of age raised for meat). Nearly three-fourths of all chickens hatched are sold as broilers.

Importance of research. Research has made a number of contributions to the field of chicken production. By 1956, 32 percent fewer feed units were required to produce 100 pounds (45 kilograms) of broilers than had been required in the 1940—44 period. In addition, between the years 1950 and 1957, when the prices of most food products climbed, the price of frying chickens dropped approximately 10 cents per pound (0.5 kilogram). Much of the credit for this price decline has been given to the development of a faster-growing broiler bird and to improvements in farm operation, such as the locating of farms close enough together so that chickens can be processed in large plants by assembly-line methods.

Consumption figures. In 1961 the average consumption of poultry in the U.S. was 36 pounds (16 kilograms) per person. In 1976 the average was 44 pounds (20 kilograms) for chicken and 9 pounds (4 kilograms) for turkey per person annually for a total of 53 pounds (24 kilograms). The leading chicken-producing states are California, Georgia, Arkansas, North Carolina, and Alabama. The leading turkey-producing states are Minnesota, California, Iowa, Wisconsin, and Missouri.

Turkey development. Turkeys also are moving away from being merely a holiday meat. The introduction by researchers of the Beltsville white turkey—a small, meaty bird for small families—has been instrumental in helping sell turkey as a year-round meat. The trend in raising turkeys is toward larger flocks on fewer farms.

The consumption of poultry and turkey will increase because of: (1) the many ways they can be used; (2) the ability to produce meat at a reasonable price to the consumer; and (3) the many new and delicious products being developed by the industry.

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 1—SUPPLY OF MEAT

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. During a normal year meat prices tend to increase and decrease according to what is known as a price __1__.
1. ________

2. It is estimated that the average American gets __2__ of his or her protein intake and __3__ of his or her caloric intake from animal products.
2. ________
3. ________

3. An important thing for the meatcutter to note is that the American diet today contains fewer __4__ than in the past, because the American worker uses less physical exertion.
4. ________

4. Another reason for changes in the American diet is that consumer __5__ has increased substantially in the last few years.
5. ________

5. Because its population has outstripped its increase in cattle production, California is known as a "cattle-__6__ area."
6. ________

6. The only meat produced in California in surplus quantities is __7__.
7. ________

7. As economic conditions improve, the American consumer tends to eat __8__-priced cuts of __9__.
8. ________
9. ________

8. The production of pork is closely tied to the production of __10__; for that reason, the leading hog-producing states are located in that area of the United States known as the __11__ Belt.
10. ________
11. ________

9. The relationship between the production of pork and the production of feed is known as the __12__ - __13__ price ratio.
12. ________
13. ________

10. The modern trend in poultry production is toward larger __14__ but fewer __15__.
14. ________
15. ________

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 2—MEAT-PACKING

This topic, "Meat-Packing," is planned to provide answers to the following questions:

- **What are the differences between a packing house, a breaking plant, and block-ready operation (prefab operation)?**
- **What is the origin of the term** *meat-packing?*
- **What is the meaning of the term** *vertical integration?*

Use of Terms

The terms *block-ready* and *prefab operation,* as well as other terms used by different chain operations for their breaking and fabricating plants, mean the same thing. Operations in these plants vary only as to the extent to which the product is broken down or as to how one operation varies from another.

The term *meat-packing* originated in Colonial America when meat was packed in barrels containing strong brine or salt and shipped to the West Indies in exchange for sugar and other products. In those days the meat-packing industry was located largely on the East Coast, but it gradually moved west with the spread of farming. By 1865 Chicago had become the center of the industry. More recently, the center has been dispersed to other cities such as Kansas City, Omaha, and Denver.

Marketing Process

The process of getting meat from the farm to the retail market includes a number of steps. At approximately midpoint stands the slaughtering and processing operation. Before that point comes the marketing of live animals by the farmer. All livestock markets are regulated by the Federal Packers and Livestock Act, which attempts to eliminate business practices considered unfair, deceptive, restrictive of competition, or otherwise harmful to the industry. The producer has the choice of selling most animals through terminal livestock markets, to packing plants directly, through local dealers, through cooperative livestock marketing organizations, or through order buyers.

Vertical Integration

Vertical integration is a system that has gained in popularity, particularly as to poultry. It is basically a system of combining production, processing, and distribution. In one such example, a processor contracts with a retail outlet to supply, to its standards, all of a certain commodity. The processor then goes to farmers and awards them contracts to supply the animals or crops to be processed for that outlet.

In California, feed companies have been encouraging such integration by contracting with growers to supply the feed and the chickens. After the chickens have been raised to market size, arrangements are made for marketing. Recently, however, this practice has begun to decline in popularity.

It is estimated that approximately 95 percent of the broilers produced in the United States are handled through some form of vertical integration. Vertical integration with beef takes place primarily in the form of contract feeding. In some cases this feeding is done under contract for ranchers who want to hold their cattle until prices go up, and in other cases it is done for packers or markets that want to be sure of a steady supply of beef. To a lesser extent this system is also being used with hogs and lambs.

Yield

Yield can be different in different areas of the operation. The yield from live weight to dressed carcass weight depends upon the grade of the meat. For example, a choice grade of beef yields 58 to 60 percent dressed weight, while cutter or canner beef, which is at the bottom of the grade, will yield as low as 45 percent dressed carcass. (See Table F-1.)

The yield of boneless meat to bone will be greater in the top grades and will be less in the lower grades.

The yield of case-ready meat from dressed carcasses is about 78 percent. This variation is caused by the amount of trim and the amount of boneless cut.

Study Assignment

Romans and Ziegler, *The Meat We Eat.* Read Chapter 4, pp. 77—110; Chapter 5, pp. 111—45; Chapter 6, pp. 147—71; and Chapter 7, pp. 173—82.

TABLE F-1
Yield of Primal Cuts of Pork, Beef, Lamb, and Veal

Pork

	Percent
Fresh ham, trimmed	21.0
Loin (blade on)	18.0
Boston butt	6.6
Fresh picnic shoulder	8.5
Squared bacon	17.3
Spare ribs	3.8
Trimmed jowl	3.0
Feet, tail, neck bones	6.4
Clear fat back, plate, and fat	11.2
Sausage	8.3

Beef

	Percent
Beef fore (52 percent of whole)	
Square chuck	26.0
Prime rib	9.0
Shank	4.0
Brisket	5.0
Short plate	8.0
	Percent
Beef hind (48 percent of whole)	
Round	23.0
Head loin	9.0
Short loin	8.0
Flank	5.0
Suet and kidney	3.0

Lamb

	Percent
Fore saddle (50 percent of whole)	
Shoulder (five ribs)	26.0
Hotel rack	9.0
Shank	5.0
Breast	10.0
	Percent
Hind saddle (50 percent of whole)	
Leg with large loin	39.0
Loin chops	7.0
Flank	2.0
Kidney and suet	2.0

Veal

	Percent
Shoulder	28.0
Trimmed rack	7.3
Shank	3.8
Breast and flank	13.4
Loin	7.7
Leg	34.0
Kidney and suet	5.8

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 2—MEAT-PACKING

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The term *meat-packing* originated in the United States when meat was packed in 1 containing strong 2 or salt and shipped to the West Indies.
   1. ________
   2. ________

2. The system of combining the production, processing, and distribution of meat is known as 3 integration.
   3. ________

3. In this country about 4 percent of the broiler 5 produced are handled through some form of integration.
   4. ________
   5. ________

4. According to the Federal Humane Slaughter Act, the methods allowed for immobilization of animals are 6, 7, and 8.
   6. ________
   7. ________
   8. ________

5. The weight lost by cattle when they are kept off feed for 24 hours before slaughter is known as 9 or 10.
   9. ________
   10. ________

6. To be made ready for shipment, carcasses of beef must be 11.
   11. ________

7. Hothouse lambs are lambs that are dropped outside of the regular lambing season and are marketed between the ages of 12 to 10 weeks.
   12. ________

8. A 5-inch (13-centimetre) scimitar 13 knife is best for pelting a lamb.
   13. ________

9. The keeping qualities of lamb and mutton carcasses depend on the temperature of the refrigerator and the amount of 14 covering the carcass.
   14. ________

10. Most markets require the "15-style" veal carcass, because the outer surface of the carcass is prevented from becoming dark and dry.
    15. ________

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 3—PREFAB OR BLOCK-READY CUTS

This topic, "Prefab or Block-Ready Cuts," is planned to provide answers to the following questions:

- **What is the meaning of *prefab* or *block-ready* cuts?**
- **How does a prefab beef program work?**
- **What are the advantages of the prefab program?**

Summary of Prefab Operations

As the first step in the operation of the prefab beef program, the beef is delivered to a central distribution warehouse. It is checked to meet specifications. Upon being accepted, it is sent into the area where the preliminary knife trimming is done. The kidney, flank, and neck trim are removed.

Production Room

From the trimming area the beef moves into the prefab production room. The beef is fed a quarter at a time to the power saw operators who cut it into 18 pieces and feed it onto a moving belt. The belt carries it down the center of the table to the meatcutters working on both sides (Fig. F-1 and F-2). The meatcutters perform the hand work necessary to prepare the various pieces of meat for all but the final cutting. When they have completed their hand work, the meatcutters put the meat back on the belt, where it is carried into a large, stainless-steel turntable used as an accumulation area (Fig. F-3).

In addition to the main belt that carries the meat, three additional conveyors work in conjunction with this table. One carries the fat to a central place. The top conveyor carries the bones outside the building, where they fall into a waiting truck. Underneath the table is a conveyor that carries the beef trimmings to a central point.

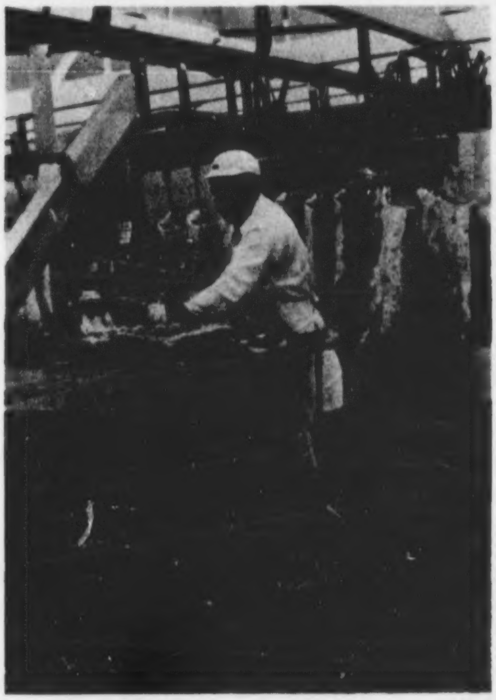


Fig. F-1. Quarters of beef cut by power saw

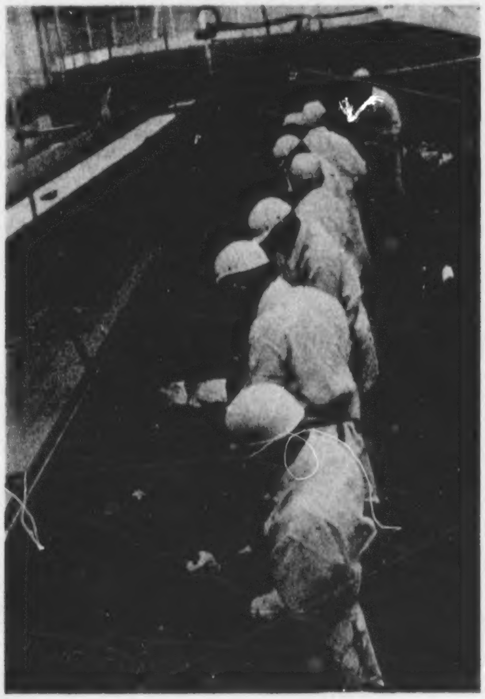


Fig. F-2. Meat prepared by meatcutters

Fig. F-3. Meat collected from revolving tray

Bagging Area

Once the meat has reached the turntable, it is at the bagging area, where it is put into cryovac bags. When the air has been drawn from a bag, the bag is sealed with a clip and sent through a tunnel of hot water that quickly shrinks the film around the meat (Fig. F-4). Some operators no longer use cryovac bags in the bagging area.

At the end of the production line, the meat is boxed according to category and is automatically weighed and labeled. The boxed meat is then placed on pallets and put into the central storage area for aging until it is sent to the stores. This process virtually eliminates the oxygen in the package and extends the holding life of the meat for many days without using chemicals or additives. While the meat is in the bag, it goes through its natural aging process, which lets the enzymes work to produce tenderness with much less dehydration or shrinkage. Also, less trim is necessary before the meat is cut into retail portions at the stores.

Centralized Purchasing and Storing

Having all beef and other meat products shipped from packing plants to a centralized warehouse has proved to be very successful for many companies. It has helped maintain uniformity of aging and the quality of beef going into the markets. When size and quality are regulated, so is fat content. Minimum fat with maximum quality ensures more profits at market level. In many cases packaged products such as luncheon meat, bacon, and canned ham can be bought in large quantities at a substantial saving to the company and distributed to the markets as needed. Controlled distribution keeps spoilage to a minimum.

Centralized Breaking and Cutting

Beef may be broken into primal or subprimal cuts.

Primal Cuts

Breaking beef into primal cuts at a central plant has proved to be very effective. This procedure enables a company to buy full-carcass beef to be broken into cuts such as chucks, ribs, roasts, and loins. In many cases all of the boning is done at the central plant, and the meat is sent out to the markets, ready to grind, in cellophane-lined boxes. If a market orders one beef, it is sent two rounds trimmed, two chucks trimmed and

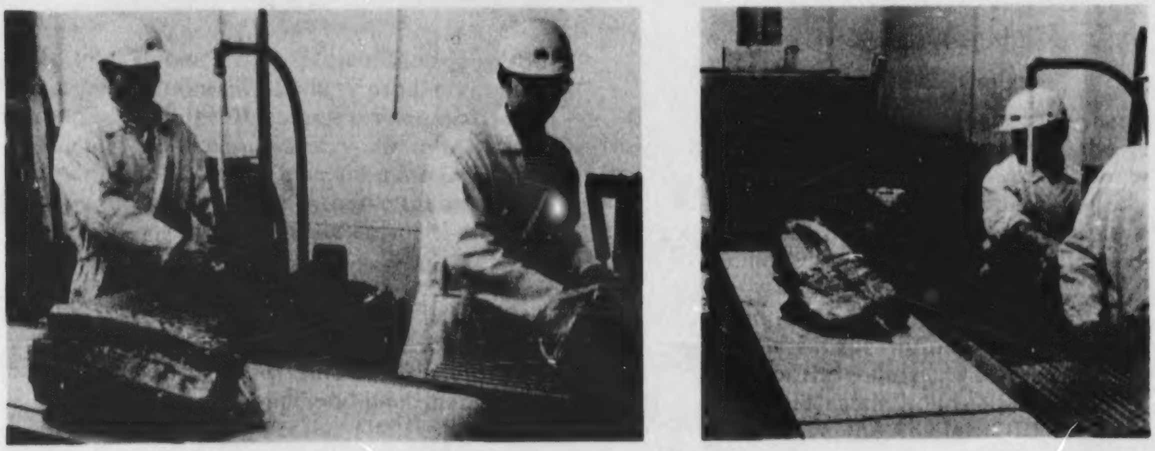


Fig. F-4. Meat sent into shrink tunnel

squared, two loins trimmed, two ribs trimmed, and a box of boneless trim ready to grind. This system saves many hours of work at the market. It also ensures uniformity of cutting at the market level. If one market uses more loins than another, the central plant can make adjustments without having to purchase extra primals. The market orders the number of each cut wanted. Balance is maintained by raising and lowering prices.

Subprimal Cuts

Some plants are going even further in their processing operation by breaking beef down to subprimal cuts or block-ready cuts that fit the needs of their particular operation. The trimming and grinding also are done at the plant. This kind of operation enables a company to maintain strict control over breaking at the store level. This method of processing also makes it possible for the meatcutter at the store level to cut just what is needed to maintain a full case at all times without stopping to break down a quarter of beef or bone trim and mix it to proper proportions. All of these things are done at the warehouse level. The cost of constructing meat departments is also minimized. Where a large amount of cooler and floor space was taken up by the conventional methods of breaking and cutting at market level, the space now may be used more economically for a display and sales area. The cost of machinery is also minimized at the store level.

Centralized Grinding

One of the best things that the prefab program has accomplished is the centralization of the grinding process. Previously, individual stores had been responsible for making ground beef. To maintain high quality under these circumstances was very difficult. Now most of the grinding is done at one place. There are still a few block trimmings accumulating at the store level which are ground at the store, but companies that are totally in the centralized prefab program grind about 90 percent of all ground meat at the central plant. After the meat is ground once, it is packed in 25-pound (11-kilogram) "keeper" cases and sealed with a clip. The meat remains in excellent condition for several days (Fig. F-5). Ground beef patties also are now available in most of the block-ready operations.

Advantages of the Prefab Beef Program

The advantages in using the prefab beef program are the following:

1. Cutting and trimming are standardized so that all beef is cut the same in all stores.
2. A better selection of beef is available at all times.
3. Shrinkage is minimized.
4. Holding power is increased two or three weeks.
5. More uniform aging is achieved under ideal circumstances. The result is juicier beef, because the meat does not dehydrate during aging.
6. Opportunities arise to stockpile for special sales. Market conditions can be used to advantage, because meat can be held until it is needed.
7. Carry-over beef from specials does not have to be priced for quick sale, because it has extended holding power.
8. Less floor space is required in the stores using prefab beef. The cutting rooms and cooler may be reduced in size in all new locations, because a need no longer exists for as much space in this area. Meat track installations are not required in new and remodeled stores.

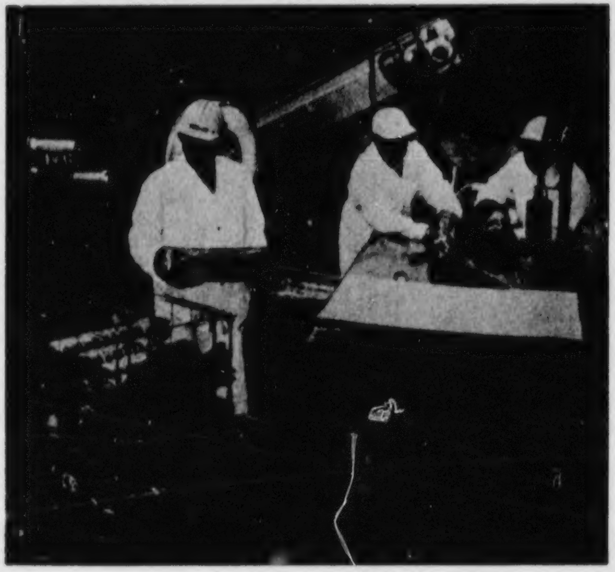


Fig. F-5. Ground beef packed in "keeper" cases

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 3—PREFAB OR BLOCK-READY CUTS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Once delivered to a central _1_ warehouse, the beef being handled in a prefab program is checked to meet _2_.

   1. ________
   2. ________

2. After being trimmed, the beef is sent to the _3_ room, where the _4_ of beef are cut, first by _5_ saws and then by hand.

   3. ________
   4. ________
   5. ________

3. In the bagging area, meat is placed in _6_ bags, which are deprived of excessive air, sealed with a clip, and sent through a _7_ of hot water that shrinks the film.

   6. ________
   7. ________

4. The shipping of beef and other meat products from _8_ _9_ to a centralized warehouse has proved to be a success for many companies.

   8. ________
   9. ________

5. The use of a centralized warehouse for meat has enabled many companies to maintain uniformity of _10_ and quality of beef going into the markets.

   10. ________

6. For breaking beef into primal cuts at a central plant, a company purchases _11_-carcass beef.

   11. ________

7. In many cases all of the _12_ of the meat is done at the central plant, and then the meat is sent to the market ready to grind.

   12. ________

8. Some plants break beef down to subprimal or _13_-ready cuts that fit the needs of their particular operation.

   13. ________

9. By means of the prefab program, the grinding process has become _14_ so that high quality of ground meat can be maintained.

   14. ________

10. The prefab program allows savings in construction of new meat departments, because cutting rooms and _15_ can be reduced in size.

    15. ________

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 4—TRANSPORTATION SERVICES AND JOBBERS

This topic, "Transportation Services and Jobbers," is planned to provide answers to the following questions:

- **In what form is most meat shipped into California?**
- **How much meat does California import each year?**
- **What is the function of the jobber?**

Two agencies occupy important positions between the farm and the California consumer. They are the transportation services that bring the meat into the state and the jobbers, who often fill a key spot between the processing plant and the retail market.

Transportation Services

As noted previously, California is a meat-deficit state. It produces annually about 56 pounds (25 kilograms) of dressed red meat per capita, the lowest per capita meat production for any state west of the Mississippi River. Therefore, most of its supply of beef, veal, pork, and lamb must be brought in from other parts of the country. The primary carriers are trucks and freight cars; smaller amounts are brought in by ship.

Forms of Meat

The meat brought in on trucks and freight cars may be in the live, fresh-killed, or frozen state. Ships carry frozen meat almost exclusively. Large refrigerated trailers are used by the trucking lines for fresh-killed or frozen meat, and refrigerated boxcars or a "piggyback" arrangement of refrigerated trailers wheeled onto flat cars are used by the railroads. Both the refrigerated trailers and boxcars are popularly known as "reefers." Starting points for many of these trips are the large packing and slaughtering centers of Chicago, Omaha, Denver, and Kansas City.

Dressed Meat

Most meat comes into California in the dressed state as carcass meat or as primal cuts. This fact is reflected in a 4 percent drop in cattle slaughter and an 11 percent drop in calf slaughter between 1967 and 1968. This decrease is due to the problems encountered in hauling live animals. More space is required for carrying live animals, and periodic stops are needed to feed and water them. These requirements make the transport of live animals more expensive than the transport of dressed meat.

Veal and some beef and pork are carried in the carcass form when frozen or fresh-killed. The largest percent of pork, however, is in primal cuts. In many cases hams and pork bellies are shipped in the "green" state; that is, in the cured state, pickled and pumped with brine solution. The hams and bellies are then smoked at the local packing plants.

Figures on the amount of dressed meat brought into California are somewhat sketchy. A preliminary study by the California State Department of Agriculture in 1961 showed that approximately 2,000 refrigerated trucks entered the state each month carrying fresh and frozen meat. Each truck carried between 30,000 and 33,000 pounds (14,000 and 15,000 kilograms).

Live Animals

More complete records on live animals are available. During 1961, 1,285,000 head of cattle and calves arrived by truck, 544,000 head by rail; 184,000 head of hogs came by truck, 1,119,000 head by rail; and 885,000 head of sheep and lambs came by truck, 584,000 head by rail. In 1966, five years later, 2,110,000 head of cattle and calves came by truck, 286,000 by rail; 141,000 head of hogs came by truck, 1,220,000 head by rail; and 977,000 head of sheep and lambs came by truck, 189,000 head by rail.

In 1968 the shipment figures were 2,012,000 head of cattle and calves by truck, 400,000 head by rail; 113,000 head of hogs by truck, 1,389,000 head by rail; and 1,033,000 head of sheep and lambs by truck, 124,000 head by rail. Only in hogs, which must come from relatively greater distances, do rail shipments exceed truck shipments. These figures are in contrast to those of 1951, when only 25 percent of the cattle and calves and 14 percent of the sheep and lambs were shipped into the state by truck. Comparable figures in 1966 included shipment into the state by truck of 88 percent of cattle and calves and 84 percent of sheep and lambs; and in 1968, 83 percent of cattle and calves and 89 percent of sheep and lambs.

Jobbers

The only way retailers used to be able to buy meat from a packer was in the form of whole carcasses of beef, pork, veal, and lamb. But the retailers soon realized that they needed primal cuts to balance their inventories and to meet particular customer demands. The jobber has been able to fill this need by purchasing whole carcass beef from a packer and fabricating the carcass into primal cuts such as rounds, loins, chucks, ribs, plates, and so forth.

Some jobbers still purchase whole hogs and block them into primal cuts such as legs, loins, shoulders, and spareribs. However, many jobbers buy these pork primal cuts directly from the packer and in turn sell these cuts to the retailers and institutions. Retailers may thus buy whole carcasses directly from the packer or jobber and also use the jobber's primal cuts to supplement their supplies to meet the particular demands of their customers.

A second important function of the jobber is to satisfy the particular needs of restaurants, hotels, and institutions. These groups usually require large quantities of only certain cuts that comprise but a small part of the total carcass. Few retail meat markets could purchase such a large quantity of carcass meat to furnish just the cuts to meet the institutional demands and still be able to find an outlet for the remainder of the carcass ("rough cuts"). Thus, when a restaurant calls for 500 New York steaks, the jobber can purchase the 21 carcasses required and then market the remaining cuts to other institutions or retail markets.

Increasing emphasis in the hotel, restaurant, airline, railroad, steamship, and institution trade is being placed on "portion control," which requires the jobber to supply all pieces of certain cuts at a fixed size and weight. This brings the jobber close to the retail style of cutting. The requirements also have extended to ground meat, which is now being made available in patty form.

In addition to the firms set up just for the purpose of jobbing, large retail companies now are buying dressed carcass animals, fabricating these carcasses into primal cuts, and supplying the cuts to their own stores. In effect, they are "jobbing" within their own organization.

UNIT F—MEAT FROM FARM TO TABLE

TOPIC 4—TRANSPORTATION SERVICES AND JOBBERS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Since California is a meat- 1 state, most of its supply of beef, veal, pork, and lamb must be imported.

1. ________

2. Meat brought into California by truck or freight car may be live, 2 -killed, or 3 ; meat brought in by ship is almost always 4 .

2. ________
3. ________
4. ________

3. Most meat comes into California in the dressed state as 5 meat or as 6 cuts.

5. ________
6. ________

4. Shipment of live animals into California for slaughter has decreased, because this practice has become too 7 .

7. ________

5. Most pork that is shipped frozen or fresh-killed is in 8 cuts.

8. ________

6. When shipped, hams and pork bellies are often in the "green" state; that is, they have been 9 and pumped with 10 solution.

9. ________
10. ________

7. The jobber exists in part to provide for the need of the meat retailers to have good supplies of 11 cuts in order to balance their 12 and to meet customer demands.

11. ________
12. ________

8. In addition, the jobber has to satisfy the needs of restaurants, hotels, and institutions for certain cuts that comprise only a small part of a total 13 .

13. ________

9. When jobbers supply their institutional customers with pieces of certain cuts at a fixed size and weight, they are participating in the practice of 14 control.

14. ________

10. A trend that has developed is for large retail companies to buy their own carcasses, fabricate them into 15 cuts, and supply the cuts to their own stores.

15. ________

UNIT G INSPECTION, CLASSIFICATION, AND GRADING

TOPIC 1—FEDERAL AND STATE MEAT INSPECTION

This topic, "Federal and State Meat Inspection," is planned to provide answers to the following questions:

- **What is the history of federal meat inspection in the United States?**
- **What percent of animals in California are slaughtered in federally inspected plants?**
- **What law does California follow in its meat inspection program?**
- **What law covers importation of foreign meat?**

Before 1884, meat inspection was carried out in only a few cities in the United States. In that year the Federal Bureau of Food and Animal Husbandry was formed. Several years later a meat inspection agency was created within this bureau, and the inspection of meat destined for human consumption was made compulsory.

Meat Inspection

The law remained ineffective until the Federal Meat Inspection Service was reestablished under the Food and Drug Act of 1906. However, as late as 1949 about one-third of all animals slaughtered for food in the United States were not inspected. Of cattle slaughtered in California in 1961, a survey showed that 80 percent were slaughtered in federally inspected plants.

A 1969 California survey showed that 2,844,000 head of beef were slaughtered in federally inspected plants and 92,000 head in other plants, for a total of 2,936,000 head, or about 97 percent. The figures on veal were 217,000 calves slaughtered in federally inspected plants and 18,000 in other plants for a total of 235,000 head, or about 92 percent. The hog slaughter in California was 1,525,000 in federally inspected plants and 24,000 head in other plants, for a total of 1,549,000 head, or about 98 percent. For lamb and mutton, 1,611,000 lambs and sheep were slaughtered in federally inspected plants in comparison with 137,000 in other plants, for a total of 1,748,000 head, or about 92 percent. In all, about 98 percent of all animals slaughtered in California were slaughtered in federally inspected plants.

It is to be expected that all meat will be slaughtered in federally inspected plants in the near future. Instructors should check with inspection offices for up-to-date inspection laws each year. California observes federal law exclusively in its meat and poultry inspection program. The importation of foreign meat is also covered by federal law.

Classification System

The Food Safety and Quality Service (FSQS) carries out the consumer protection responsibilities of the U.S. Department of Agriculture. The FSQS performs mandatory inspection of meat, poultry, and egg products to help ensure that these foods are safe to eat; develops grade standards for food; and provides voluntary grading services for meat, poultry, eggs, and dairy products. It also provides grading services for fresh, canned, frozen, and dried fruits and vegetables.

Publications and other informational materials are issued to inform and educate the public about FSQS programs. The subjects covered include how to keep food safe to eat, how to use USDA grades in buying food, what FSQS services are available to the food industry, and how the public can take part in departmental decisions. Many of these publications also are prepared in Spanish.

Single copies of publications are free, as long as the supply lasts, unless a price is given. Unless otherwise indicated, requests should be mailed to:

FSQS Information
Room 3059-S
U.S. Department of Agriculture
Washington, DC 20250
Telephone: (202) 447-5223

Requests for publications—and for loan of films—may also be directed to the FSQS regional information offices. The office for the western states (Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming) is:

Information Division, FSQS, USDA
630 Sansome Street, Room 702
San Francisco, CA 94111
Telephone: (415) 556-6464

Grading System

The development of grading standards is well covered in *The Meat We Eat* (pp. 263—379).

When numbers are used in grading, they signify the yield grade of the carcass of meat to bone. Grades such as "prime," "choice," and "good" are quality grades. They designate the quality or finish of the meat.

Study Assignment

1. Romans and Ziegler, *The Meat We Eat*. Read pp. 25—76 and 263—379.
2. *Sherman Food, Drug, and Cosmetic Law of 1970.* Berkeley: California State Department of Public Health, 1970. Read sections assigned by the instructor.
3. Food Service and Quality Service (FSQS) facts about labels on meat and poultry products. Information is available from the USDA's Food Safety and Quality Service at the following address:

U.S. Department of Agriculture
FSQS Information, Room 3059-S
Washington, DC 20250

UNIT G—INSPECTION, CLASSIFICATION, AND GRADING

TOPIC 1—FEDERAL AND STATE MEAT INSPECTION

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. In 1884 the Federal Bureau of __1__ and Animal __2__ was formed.

1. ________
2. ________

2. Later, a meat inspection agency was created within this bureau to see that meat intended for __3__ consumption would be inspected.

3. ________

3. The Federal Meat __4__ Service was reestablished under the __5__ and Drug Act of 1906.

4. ________
5. ________

4. As late as 1949, __6__ of all animals slaughtered for food in the United States were not __7__.

6. ________
7. ________

5. Federal law rules in California's __8__ __9__ program; federal law also regulates the importation of __10__ meat.

8. ________
9. ________
10. ________

6. One purpose of federal regulations on meat inspection is to safeguard the public by eliminating __11__ or otherwise bad meat from the food supply.

11. ________

7. Another purpose of federal regulations is to enforce the sanitary __12__ of meat and meat products.

12. ________

8. Prevention of the use of false or misleading names or statements on __13__ is a further intent of federal regulations on meat inspection.

13. ________

9. When federal regulations on meat inspection have been complied with, an establishment is granted an official __14__ that appears on the inspection stamp.

14. ________

10. The cost of meat inspection for each consumer is about __15__ cents per month.

15. ________

UNIT G—INSPECTION, CLASSIFICATION, AND GRADING

TOPIC 2—CLASSIFICATION OF MEAT

This topic, "Classification of Meat," is planned to provide answers to the following questions:

- **Why is it important for the meatcutter to know the classes of meat?**
- **What is the basis of the classification of meat carcasses?**
- **What are the different classes of beef, pork, lamb, mutton, and veal?**

Learning the various classes of meats may no longer be as important to the meatcutter as it was before the advent of precut meats. However, the apprentice may one day be working in a market that buys full sides of meat. Market managers have to know the classes of meat before they can do any buying. And all members of the trade will be confronted with questions from their customers for which they will need such information.

The first requirement in the identification of meat is recognizing the classes. Classification of beef carcasses is established on the basis of sex, pork primarily on the basis of use, lamb on the basis of age, and mutton on the basis of sex condition. With veal, only the market classes are important.

Beef Classification

The sex characteristics of beef cattle do not have a noticeable effect upon the meat until after the animal has reached sexual maturity, usually between 4 and 5 months of age. The five classes into which beef carcasses are divided are as follows:

Steer—A very young male bovine that has been castrated before reaching sexual maturity. The carcass may be identified by the presence of a considerable amount of fat in the cod or sac from which the sex organs have been removed. The white pizzle eye at the posterior end of the aitchbone has the shape of the exposed face of the gracilis muscle. Steers have a lean area of top round, large joints at the end of the foreshank, less internal fat, and a small pelvis. Prime and choice steer beef are considered to be the highest in class and best in quality for eating and aging; they are a gourmet's delight.

Heifer—A female bovine that has never given birth to a calf; thus, it is younger than a cow. One of the unmistakable signs of a heifer is the appreciable quantity of udder fat. Heifers have a lean area of top round, smaller bones than those of a steer, more internal fat, and a smaller eye in the loin and rib. The pelvic bone and the bone in the loin butt are larger than those in a steer.

Stag—A male castrated after it has reached sexual maturity. It is intermediate between a steer and a bull and resembles one or the other, depending on the age at which it was castrated.

Cow—A female bovine that has borne one or more calves. The fat is softer, oilier, and greater in quantity than that in a heifer or steer. The fat is not evenly distributed, the hip and shoulder joints are more prominent than those in a heifer or steer, and the bones are usually harder. The percent of meat (subtracting the bone and fat) is less in a cow than it is in a heifer or steer.

Bull—A male bovine allowed to retain sex characteristics. The bulls have large, thick forequarters and neck; a crest or hump on the back; flatter loins and ribs; coarse, dark flesh; hard bones; and not much fat covering.

Pork Classification

The pork sold in retail markets comes from hogs that are from 6 to 12 months old. Classes of pork based on sex are not as important to the eating quality of the meat as are the classes of beef. Instead, the classes of pork based on use are of greater importance.

Sex Classification

The sex classification of pork is as follows:

Shoat—A young hog of either sex

Barrow—A male hog castrated before reaching sexual maturity

Gilt—A young female swine in which sex characteristics are not developed

Stag—A male hog castrated after reaching sexual maturity

Boar—A male hog allowed to retain sexual characteristics

Sow—An adult female swine that has farrowed one or more litters

Use Classification

Classes of pork based on use are as follows:

Fat or butcher type—Either the male or female of fat breeds from hogs that are blocky in conformation. The predominant breeds in the United States are Poland China, Berkshire, Duroc Jersey, Chester White, and Hampshire.

Lean, meat, or bacon type—Either the male or female of meat breeds, from long, lean hogs raised mostly in Canada and England. These breeds are Tamworth and large Yorkshire.

Sows—The meat from either fat or lean type is used mostly for salt pork and cured pork or for sausage.

Shippers—Either male or female, dressed with head on and shipped as a whole carcass. The fat is untouched, and the backbone is not split. Shipper hogs are light in weight and have less finish.

Roasting pigs or sucklings—These carcasses are from fat, smooth young pigs with light-colored flesh and soft red bones. Suckling pigs are sold mainly to hotels and restaurants. The carcasses weigh 10 to 30 pounds (5 to 15 kilograms).

Lamb and Mutton Classification

Sheep carcasses are divided into two main groups based on age—lamb and mutton. As with pork, sex classes of lamb are not important to eating quality, but age is very important. Because the animals mature when they are between 12 and 14 months old, the change in the character of the meat resulting from age—the change from lamb to mutton—then takes place.

Lambs are more important in the market than sheep; lambs furnish about 90 percent of the meat. Lamb can be identified by the break joint that is located on the lower foreshank. In a lamb the leg can be broken at this joint in such a way that four well-defined ridges will remain. The ridges are not sharp but fairly smooth, moist, and red with blood. With mutton the break will have to be made at the fetlock, or round joint, which is just below the true break joint. Identification by weight is impractical, because an excellent carcass of fed lamb often weighs more than a mutton carcass. However, all mutton has a larger proportion of fat and is more firm than lamb. The lambing season extends mainly from December to June. Lambs are classified as follows:

Hothouse lamb—From 2 to 4 months old. These lambs are raised under artificial conditions indoors, dressed with pelt on, and are a fancy item, mainly for the Easter trade. (This grade is not used in California.)

Genuine spring lamb—From 3 to 5 months old. This class of lamb is available from March to November. Lamb at this age is the best in quality for eating. The meat is light pink and tender.

Spring lamb—From 5 to 8 months old. It is available from July to December. The meat is not as tender as that of genuine spring lamb, but it is very tasty.

Lamb—From 8 to 12 months old. It is fat, heavy, and not as tender as the first three classes. It is available from January to May, usually after spending some months in feed lots.

Yearling (mutton) is distinguished from lamb by its larger size, wider abdominal cavity, whiter color of the break joint, and darker red color of the outside muscle covering the flank and ribs.

The three most important classes of mutton, based on sex conditions, are as follows:

Wether—From a mature male sheep that was castrated as a young lamb. It can be distinguished from ewe mutton by a fairly large supply of cod fat, by a more regular conformation, a higher percentage of flesh, and smaller forequarters in relation to hindquarters. The taste of cooked mutton flesh is strong and sometimes has a peculiar odor. The oil from the mutton wool is absorbed into the flesh.

Ewe mutton—From female sheep that are at least 20 months old at the time of slaughter and have given birth to lambs. They have large middles and small necks and shanks. Certain parts of the udder that remain help to identify this carcass. The taste and odor of the flesh is the same as that of the wether.

Buck mutton—From male sheep that have never been castrated and are more than 2 years old at the time of slaughter. These carcasses are short and have large bones and coarse, dark flesh.

Veal Classification

Considerable confusion exists among retailers and consumers as to the difference between veal (or vealers) and calves. According to the Bureau of Agricultural Economics of the U.S. Department of Agriculture, a vealer is a young bovine of less than 3 months. A calf is a young bovine of more than 3 months.

No sex classifications have been established for veal, because it is not old enough for sex conditions to influence its physical characteristics. Veal is sold for slaughter purposes only. The three main factors considered are conformation, finish, and quality. Market classes for slaughter calves are steer, heifer, and bull. Here again, sex classification is not of importance.

UNIT G—INSPECTION, CLASSIFICATION, AND GRADING

TOPIC 2—CLASSIFICATION OF MEAT

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Beef carcasses are classified according to 1 ; and pork carcasses, primarily according to 2 . — 1. ________ 2. ________

2. Lamb carcasses are classified according to 3 ; and mutton, according to 4 condition. — 3. ________ 4. ________

3. Beef considered to be highest in class and best in quality for eating and aging is prime and choice 5 beef. — 5. ________

4. The pork sold in retail markets comes from hogs that are 6 to 7 months old. — 6. ________ 7. ________

5. A fat or 8 -type hog is either the male or female of a fat breed from hogs 9 in conformation. — 8. ________ 9. ________

6. A male or female hog dressed with head on and shipped as a whole carcass is classified as a 10 . — 10. ________

7. The class of lamb that is 3 to 5 months old and has light pink, tender meat is known as 11 spring lamb. — 11. ________

8. The change in classification from lamb to mutton occurs when the animals are 12 to 13 months old. — 12. ________ 13. ________

9. The yearling (mutton) carcass is distinguished from lamb by its size, abdominal cavity, color of the break joint, and 14 red color of the outside muscle. — 14. ________

10. The three main factors considered in judging a vealer are conformation, finish, and 15 . — 15. ________

UNIT G—INSPECTION, CLASSIFICATION, AND GRADING

TOPIC 3—GRADING OF BEEF AND OTHER MEAT PRODUCTS

Federal grading, which is a voluntary service except in time of national emergency, provides the consumer with a reliable guide to meat quality. Standards for different meats vary. This topic deals separately with the grading of (1) beef and veal; (2) pork; (3) lamb, yearling, and mutton; and (4) poultry.

Grading of Beef and Veal

This subtopic, "Grading of Beef and Veal," is planned to provide answers to the following questions:

- **What is the technique of grading beef carcasses?**
- **What is meant by the experimental dual grading system?**
- **Why must the grader of beef carcasses be able to identify the carcasses by sex?**

Grading of Beef

Beef carcass grading is the act of determining, by the visual examination of a carcass, those features and qualities set forth in precise standards that make it eligible to be classified under one of the federal grades. Grading also involves the ability to identify sex, because steer, heifer, and cow carcasses are graded by one set of standards and bull and stag carcasses by another set of standards.

Until recent years this grading has been confined largely to determining the value of a beef carcass on the basis of the quality of palatability of lean meat. However, the U.S. Department of Agriculture has developed a dual grading system that is available on an optional basis along with the former single official standards.

Under this grading plan the quality grade (USDA Prime, Choice, and so forth) is determined and identified as is done under the old standards. At the same time a yield grade (No. 1 to be the highest and No. 6 the lowest) is added. Thus, this grading system indicates both the quality of the meat and the percent of salable meat (trimmed retail cuts) a carcass will yield. The yield grading system is now being used widely and is assuming greater importance.

Grading of Veal

Veal or vealers are sold on the market at 4 to 12 weeks of age. Calves are more than 3 months old when marketed. Grade standards for veal and calf must necessarily be different from those for beef. These standards are not affected (nor are pork and lamb) by the USDA's dual grading system.

Grading of Pork

This subtopic, "Grading of Pork," is planned to provide answers to the following questions:

- **How does the grading of pork differ from the grading of other meats?**
- **What does the grade of a pork carcass refer to?**
- **What are the different grades of pork?**

The grading of pork carcasses (barrows, gilts, and sows) is different from the grading of other meats in that one of the standards is the relative proportion of lean cuts to fat cuts in the carcass. The official U.S. standards for grades of pork carcasses became effective in 1952.

Grading of Lamb, Yearling, and Mutton

This subtopic, "Grading of Lamb, Yearling, and Mutton," is planned to provide answers to the following questions:

- **Why must the meatcutter be able to distinguish lamb, yearling, and mutton?**
- **What standards are used to establish grades?**
- **What are the different grades for lamb, yearling, and mutton?**

The meatcutter must be able to distinguish between lamb and yearling and between lamb and mutton so that he or she will not sell yearling or mutton to the customer instead of the requested lamb.

Grading and Classification of Poultry

This subtopic, "Grading and Classification of Poultry," is planned to provide answers to the following questions:

- **What is the difference between kind and class of poultry?**
- **What determines the meat yield of poultry?**
- **What is the difference between standards of quality and grades for poultry?**

As with the grading of beef, veal, pork, lamb, yearling, and mutton, the federal grading of poultry is voluntary. The two main types of poultry that are graded are chicken and turkey. Also graded are ducks, geese, guineas, and pigeons.

Study Assignment

1. Romans and Ziegler, *The Meat We Eat.* Read "Beef Carcass Grading," pp. 265—314; "Veal and Calf Carcass Grading," pp. 314—17; "Pork Carcass Grading," pp. 347—62; "Lamb, Yearling Mutton, and Mutton Carcass Grading," pp. 317—47; and "Poultry," pp. 183—209.
2. *Official United States Standards for Grades of Carcass Beef.* Washington, D.C.: U.S. Department of Agriculture, Food Safety and Quality Service, 1975. Read sections assigned by the instructor.
3. *Official United States Standards for Grades of Veal and Calf Carcasses.* Washington, D.C.: U.S. Department of Agriculture, Agricultural Marketing Service, 1972. Read sections assigned by the instructor.
4. *Official United States Standards for Grades of Lamb, Yearling Mutton, and Mutton Carcasses.* Washington, D.C.: U.S. Department of Agriculture, Food Safety and Quality Service, 1969. Read sections assigned by the instructor.
5. *Poultry Grading and Inspection.* Washington, D.C.: U.S. Department of Agriculture, Poultry Grading Manual Handbook No. 3, Food Safety and Quality Service, 1977. Read sections assigned by the instructor.

UNIT G—INSPECTION, CLASSIFICATION, AND GRADING

TOPIC 3—GRADING OF BEEF AND OTHER MEAT PRODUCTS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

Grading of Beef and Veal

1. For meat to be eligible for federal grading service, it must first be 1 under federal or other federally approved authority.
   1. ________

2. *Grade* is the term used to denote the 2 of conformation, finish, and quality of a carcass or cut according to established 3.
   2. ________
   3. ________

3. In very young beef carcasses, the lean flesh has very fine texture and light 4 color; in more mature carcasses, the lean flesh is coarser and darker 5 in color.
   4. ________
   5. ________

4. The quality grade of a beef carcass or wholesale cut is based on the quality or the 6 -indicating characteristics of the 7 and the 8 of the carcass or cut.
   6. ________
   7. ________
   8. ________

5. By considering the 9 and firmness of the lean in a cut in relation to the apparent 10 of the beef animal from which the carcass was produced, the grader can evaluate the quality of the lean.
   9. ________
   10. ________

6. Superior conformation in beef cattle implies a high proportion of 11 to bone and a high proportion of the weight of the carcass or cut in the more 12 parts.
   11. ________
   12. ________

7. *Cutability* refers to the percent of trimmed 13 beef cuts that the chuck, rib, loin, and round will yield collectively or as separate 14 cuts.
   13. ________
   14. ________

8. Prime grade vealers are usually crossbred or high-grade animals of the 15 type, or they are exceptional individuals of the 16 breeds.
   15. ________
   16. ________

9. Vealers of good grade are more 17 than those of prime grade and choice grade; good grade vealers show mostly 18 breeding.
   17. ________
   18. ________

10. To discourage the sale of 19 veal, most states have legislation regulating the legal 20 at which vealers may be slaughtered.
    19. ________
    20. ________

Grading of Pork

1. Grade standards developed by the U.S. Department of Agriculture for pork carcasses reflect the quality of pork and the relative proportion of 1 cuts to 2 cuts.
   1. ________
   2. ________

2. Medium grade pork carcasses are 3 and lack acceptable palatability because of absence of firmness and little or no 4 in the lean.
   3. ________
   4. ________

3. Closely related to yields and quality of pork cuts are measurements of average back 5 thickness in relation to carcass weight or 6.
   5. ________
   6. ________

4. Barrow and gilt carcasses having minimum finish for U.S. No. 1 grade are slightly 7 and moderately 8 in relation to weight.
   7. ________
   8. ________

5. U.S. No. 1 grade pork bellies are moderately long and smooth, slightly 9 , and moderately 10 in thickness.

9. ________
10. ________

6. In U.S. No. 2 grade pork, the meatiness based on yield of lean cuts in relation to carcass weight is slightly 11 ; yield of fat cuts is slightly 12 .

11. ________
12. ________

7. Pork carcasses in U.S. No. 3 grade have an acceptable quality of lean, a slightly low yield of 13 cuts, and a slightly high yield of 14 cuts.

13. ________
14. ________

8. In utility grade pork the yield of lean cuts in relation to carcass weight is 15 ; yield of fat cuts is 16 .

15. ________
16. ________

9. U.S. standards for grades of slaughter sows and sow carcasses are based on differences in yields of 17 cuts and 18 cuts and differences in quality of pork.

17. ________
18. ________

10. The ink used in stamping meat is made from a 19 dye that is 20 and does not have to be trimmed off the meat.

19. ________
20. ________

Grading of Lamb, Yearling, and Mutton

1. Lamb carcasses having minimum qualifications for prime grade are moderately wide and thick in relation to their 1 and have moderately wide and thick 2 .

1. ________
2. ________

2. Further, prime grade lamb carcasses have moderately plump and full 3 and moderately thick and full 4 .

3. ________
4. ________

3. As to fat requirements, prime grade lamb must have at least a very thin covering of external fat over the top of the 5 and the outsides of the upper parts of the 6 .

5. ________
6. ________

4. Good grade young lamb carcasses have traces of 7 between the ribs but no 8 streaking on the inside flank muscle.

7. ________
8. ________

5. Utility grade lamb carcasses are very angular and very narrow in relation to their 9 , and they have hips and shoulder joints that are plainly 10 .

9. ________
10. ________

Grading and Classification of Poultry

1. A Rock Cornish game hen is a young, immature chicken (usually 1 to seven weeks of age) weighing not more than 2 pounds at the ready-to-cook stage.

1. ________
2. ________

2. A broiler or 3 is a young chicken of either sex that is tender-meated and has soft, pliable, 4 -textured skin and flexible 5 cartilage.

3. ________
4. ________
5. ________

3. The main difference between a broiler and roaster is that the roaster is older, usually three to 6 months of age.

6. ________

4. A 7 is a surgically 8 male chicken that is usually under eight months of age.

7. ________
8. ________

5. A hen or stewing chicken is a mature female chicken usually more than 9 months of age that has meat less tender than that of a roaster and a nonflexible 10 .

9. ________
10. ________

6. A yearling tom turkey is a fully matured male turkey usually under 11 months of age.

11. ________

7. The flavor of broth and gravies derived from poultry is directly dependent on the _12_ covering of the bird.

12. ________

8. The meat yield of poultry is affected by size and, to a certain extent, by standards developed for _13_ .

13. ________

9. Regardless of other quality factors, the nutritive value of poultry appears to be rather constant within individual _14_ of poultry.

14. ________

10. Standards of quality for poultry refer to the quality evaluation of an individual bird; grades usually apply to wholesale _15_ of birds.

15. ________

UNIT II MEAT SALES PROMOTION

TOPIC 1—MEAT DISPLAY

This topic, "Meat Display," is planned to provide answers to the following questions:

- **Does the use of display cases free the meatcutter from otherwise promoting the purchase of meat items?**
- **Why does the display case play such an important part in customer purchases?**
- **What are some different kinds of case displays that are being used?**
- **What are the marks of a good display?**

In the early 1940s the self-service meat department began to be developed. Since then it has spread across the country and is now established in stores in practically every community. In this type of operation, meat is cut at a central location in the department; then it is packaged, weighed, labeled, and placed in display cases from which the customer can make his or her own selection. The meat itself and the showcase in which it is displayed have taken over a large part of the selling job.

Self-Service Meat Department

The system of self-service does not, however, free meatcutters from all responsibility for selling. Even markets equipped with self-service cases provide a bell by which customers may summon the meatcutters. The meatcutters must be available to answer questions from customers as to the proper methods of preparation for individual cuts; to suggest cuts for special occasions; to make up special packages to meet individual needs; or to provide customers with facts about meat. In a less direct way, meatcutters must also continue to sell their products through the display methods they have developed for the meat department.

Display Equipment

The new type of self-service display case allows the meat department to serve many more customers at a time. This innovation has opened the way to an increased volume of business and has introduced a new set of display possibilities. The case serves as a "salesperson," whether it is the service type, semiself-service type, or self-service type. It is the meatcutter's personal contact with the customers.

Point of purchase. The self-service display case has stimulated a new concept of selling known as "point of purchase" (P.O.P.). Shoppers who see the display case tend to do more impulse buying; that is, they actually purchase items they had not planned to buy. One estimate shows that about 65 percent of all retail grocery sales are based on impulse.

Variety of display. Many different types of case display are possible. Not all markets may be able to sell the same type of merchandise, however, because location (e.g., in neighorhoods containing many large families and different nationalities) and seasonal trends influence both the displays and the arrangements.

Recent Trends

One recent trend is the reestablishment of a customer-meatcutter relationship through the process of moving the meat-handling operations out of back rooms. Meat counters have been moved forward, and the back wall has been moved back so that weighing and packaging operations are now being performed just behind the meat counter in full view of customers. In other markets glass windows have replaced the upper part of the wall separating this work and the display counter. A further effort in this direction is the attempt by some markets to break up the long line of meat counters by using the open-faced, multiple-decked case.

Another idea being tried is greater use of posters over the meat department, in front of certain items, or on the wall in the back of the department. The use of mobile displays at other points in the store also calls attention to certain items. Some meat departments have found success in placing some meat cuts that do not sell quickly next to those that do.

Other markets are making greater use of recipe suggestions by placing recipe booklets in racks in the department or by adding recipe cards to the packages of meats. The case display can also be used to give special attention to holiday items, such as turkeys for Thanksgiving, hams and turkeys for Christmas, hams and spring lamb for Easter, and seafood and fish for Lent.

Throughout the period of warm weather, barbecue displays of various kinds can be used. The display case can feature thick steaks and chops; quartered and halved broiler and frying chickens; boneless rolled roasts; and different kinds of ground sirloin, round, shoulder, and chuck. To appeal to customers who like shish kebab, the market can offer cubes of lamb. For owners of home freezers, the meat department can offer primal cuts, quarters, and sides of beef.

Another idea is to combine meat and complementary items, such as packages of cheese in the case beside meat loaf; pats of butter or sprigs of parsley in packages of ground meat; strips of suet in packages of veal; sauerkraut jars beside spareribs or frankfurters; buns, relish, and mustard beside frankfurters; sprigs of parsley and slices of lemon in packages of fish; jars of tartar sauce, hot sauce, lemon juice, and cracker crumbs in the case with fish; and meat loaf in aluminum pans in which it can be baked.

Qualities of a Good Display

Meatcutters will find that packinghouses and supply companies have a variety of poster units and ideas to help in preparing attractive displays. Merchandising experts, psychologists, and advertising people have made studies of what constitutes a good display. Their findings tend to differ depending on the individual product, store, or customer. In general, however, they conclude the following: (1) a display must be attractive—it must draw customers, not repel them; (2) it must lead to easy identification—customers must be able to read it and instantly recognize its message; and (3) the product advertised must be easily reached—the customer will probably not make an effort to search for it.

In addition, displays should not be allowed to go "stale." If a customer sees the same display every time he or she enters a store, the display will have little impact on him or her. Moreover, banners and other large displays can lose their effectiveness if they are used too abundantly, and large posters are not always the most effective ones.

Cleanliness

The display case and all personnel should be clean and neat. Walls and surrounding areas must be clean and painted. Floors should be clean and waxed.

Variety

A good selection of meat should include many different cuts and a good selection of each individual cut. A display of all advertised items should be prepared at the time the advertisement is published, and sufficient merchandise should be on hand to keep the display full for the duration of the sale. Gourmet sections are becoming a very important part of many meat departments.

Color Scheme

Color variations in the display can be as important as color and styling are in your home or in the clothes you wear. The display represents the products of your trade. The arrangement of meat in the case should catch the customer's attention.

Seasonal and Holiday Occasions

Seasonal and holiday occasions are a good time to push the foods of the occasion. The meat department should have a good selection of the items that are appropriate for the time of year or holiday.

Demonstrations

Some companies furnish a demonstrator and the product for sampling. This is a good way to introduce a new product or boost the sale of an established product.

Group Discussion

Be prepared to discuss the following topics if you are asked to do so:

1. Discuss features you would use for meat displays for the month of May.
2. Suggest some meats and complementary items—other than those in the text—that can be used in a meat department.

UNIT H—MEAT SALES PROMOTION

TOPIC 1—MEAT DISPLAY

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. In the self-service meat department, meat is cut at a 1 location in the department and packaged, 2 , labeled, and placed in display cases.
   1. ________
   2. ________

2. The self-service display case has stimulated the development of a new concept of 3 called point of 4 .
   3. ________
   4. ________

3. An important thing for the meatcutter to keep in mind is that about 5 percent of all retail grocery sales are based on 6 .
   5. ________
   6. ________

4. A recent trend in 7 meat departments is the reestablishment of the butcher-customer relationship by moving the meat-handling operations just behind the meat 8 .
   7. ________
   8. ________

5. By the use of 9 -faced display cases, the meatcutter can break up the monotony of a long line of meat counters.
   9. ________

6. Posters can be used above the meat department, in front of certain items, or on the 10 at the back of the department.
   10. ________

7. In an effort to call attention to certain items away from the meat department, 11 12 are sometimes used.
   11. ________
   12. ________

8. During the summer, many meat departments display methods of 13 meat.
   13. ________

9. Another successful idea to stimulate sales is to combine meat and complementary items, such as 14 sauce in a fish case.
   14. ________

10. It is generally agreed that a good display must be attractive, must lead to easy identification, and must be within easy 15 since the customer will not search for it.
    15. ________

UNIT H—MEAT SALES PROMOTION

TOPIC 2--CUSTOMER RELATIONS

This topic, "Customer Relations," is planned to provide answers to the following questions:

- **What attitude should the meatcutter have toward his or her customers?**
- **Why should the meatcutter try to educate his or her customers?**
- **Why is it important for the meatcutter to have good personal habits?**

The average customer knows very little about the different cuts of meat, the part of the animal the cuts come from, the proper way to prepare these cuts, and the method of freezing fresh and cooked meats. The meatcutter should pass on this information to the customer.

Importance of the Customer

The customer is the most important person that comes into the store. He or she is not an interruption of the meatcutter's work but a vital necessity to the meatcutter's job. The customer pays the wages of the meatcutter as well as the expenses of the business. The customer makes the net profit possible, which in turn makes the investment possible. Each customer should be treated with care, whether male or female, young or old, pretty or homely. The customer or consumer is as important to the meatcutter and his or her family as the meatcutter is to the store owner and his or her family. Some of the best advertising a store receives is that passed on by consumers to their neighbors and friends. This practice also works in reverse. The meatcutter should remember the importance of customer relations when dealing with each customer.

Education of the Consumer

Personal contact between customer and employee has apparently become obsolete. It has become an effort for the meatcutter to give personalized service to a customer. Yet in most major chain markets, service and quality are the most important words. The employee sometimes forgets that without customers the meatcutter's job would not exist. The customer is entitled to consideration and attention, for the employee is not doing the customer a favor; the customer is doing the favor by coming in and making a purchase. Because the customer pays for it, he or she is entitled to service.

The most important food item in the family budget is meat. About 40 percent of family spending for food goes to the buying of meat, and 80 percent of these meat purchases are based on impulse. When customers are satisfied and have confidence in a meatcutter, they will continue their patronage and recommend the place to their friends. When a meatcutter is asked how to cook a certain cut of meat, he or she should be able to suggest several recipes for each cut. The meatcutter should also be able to suggest how to use any leftovers. The customer should not be misled as to the quality and tenderness of a cut of meat. There are no tough cuts of meat; the method used in cooking each cut makes it tender or tough. The customer should be educated in the proper methods of cooking meat, fish, and poultry.

The meatcutter should inform the consumer about meat as follows:

1. The term "meat" applies to the flesh of beef, pork, veal, mutton, and lamb.
2. Meat is an excellent source of vitamins and minerals and is said to be a complete protein.
3. A complete protein contains the essential amino acids, which are vital in maintaining proper body growth and repair.

Customer Relations

In handling customers, meatcutters must have several roles. First, they are meat buyers. They must know meat and meat values and keep up with the ever-changing trends. Second, they are meatcutters; they must know modern cutting methods and the cuts of meat the customer may want. Third, as display artists they must know how to arrange displays. Fourth, they are meat cookery experts, because a customer will not buy a piece of meat if he or she does not know how to cook it. Fifth, they are salespersons. The day is past when all the meatcutter had to do was stock the meat case and wait for customers to make their purchases.

Types of Customers

Basically, the meatcutter encounters three types of customers. Some customers come to the market and know exactly what they want. They should never be given substitutes, because they have specific reasons for making their requests.

Other customers are looking for help, because they know only in a general way what they want. They depend on the meatcutter to help with suggestions. Last are those customers who do not know what they want. Because of the large numbers of customers who fit into this category, the meatcutter should have his or her suggestions ready. The meatcutter should be able to plan a meal around the meat he or she suggests, tell the customer how to cook it, and suggest what vegetables and salad to serve with it.

Personal Neatness

Personal neatness is usually thought of as care of one's clothing, hair, and nails. However, one's manners and personal habits are just as important as a shave, haircut, clean fingernails, or clean clothes. Sometimes, personal habits can spoil customer relations. To ensure good relations, the meatcutter should observe the following rules.

- Have clean, pressed clothes.
- Practice the basic rules of hygiene.
- Have the hair well groomed and cut.
- Have clean fingernails.
- Don't smoke while working with food.

Good Manners

Customers like to be greeted with a cheerful smile, and the meatcutter should be pleasant and helpful to them. Learning customers' names and greeting the customers by name often helps establish good relations. In talking with customers, the meatcutter—or any other salesperson–must use a pleasant voice. Customers welcome suggestions more readily if they are made in a pleasant and courteous manner.

Of prime importance is remembering that the customer should receive fair, prompt, and courteous attention. One survey to determine why stores lost customers revealed the following complaints: "high prices," "poor quality goods," "delays in store service," and "indifferent salespeople."

The following is an example of a delay in service and an indifference to the customer's feelings. A customer requested a sirloin tip roast and was told it would take a few minutes. There were five tips on the cutting table. The meatcutter proceeded to cut and wrap all five roasts. Just as the meatcutter was beginning to wrap the second package, the customer left the store in a rage. This indifference on the part of the meatcutter lost the store a very good customer. If the meat department is to be successful, it must have repeat business.

Harmony

A happy work crew will produce more than an unhappy crew. A happy crew has better customer relations than an unhappy crew. Friction in a crew can be felt to a certain degree by the customer. Many times we allow our personal feelings to affect our work and the way we treat our fellow workers. We must remember that we are all there to earn a living. That means 8 hours work for 8 hours pay—no more, no less. Forget about your personal differences; you do not have to associate off the job. Treat your fellow worker as you would have him or her treat you. There is no excuse for anyone to abuse a fellow worker. It takes the success of all departments to have a successful operation. Harmony is one of the keys to success.

UNIT H—MEAT SALES PROMOTION

TOPIC 2—CUSTOMER RELATIONS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. It is estimated that 1 percent of the money spent by an average family for food is spent for meat and that 2 percent of meat purchases are based on impulse.

1. ________
2. ________

2. Meat is an excellent source of vitamins and 3 .

3. ________

3. Meat is a complete 4 containing the essential 5 acids vital to maintaining correct body 6 and repair.

4. ________
5. ________
6. ________

4. As important for the meatcutter as the care of his or her clothing, hair, and nails is his or her practice of good 7 and the development of good personal 8 .

7. ________
8. ________

5. In dealing with customers, the meatcutter should greet them by 9 when possible and speak to them in a 10 voice.

9. ________
10. ________

UNIT H—MEAT SALES PROMOTION

TOPIC 3—COOKING MEAT

This topic, "Cooking Meat," is planned to provide answers to the following questions:

- **Why should the meatcutter be familiar with the cooking of meat?**
- **What are the effects of high temperatures on meat?**
- **Why is the meat thermometer so important?**
- **What are the basic methods of cooking meat?**

Learning how meat should be prepared is an important part of the meatcutter's training. Self-service markets encourage the customer to ring the bell located over the meat display and ask the meatcutter who answers it how to prepare certain cuts. The meatcutter must be prepared to reply to such questions, not just guess at answers. In the service markets this ability is even more necessary.

Importance of Cooking Ability

Meatcutters should practice to be good cooks. They should plan to cook at least one meal a week during their two-year training program. They should vary the meals that are cooked each week. If a new item is stocked in the store, they should take it home and serve it to their families. Then they can give an honest evaluation of the item when they are asked about it by a customer.

Meat generally contains more connective tissue and fat than do other types of flesh such as chicken and many kinds of fish. The texture and amount of connective tissue differ among animals and in different parts of the same animal. The connective tissue holds together and connects the muscles, fat cells, fibers, and constituents of the flesh. In cooking, when this connective tissue is destroyed or weakened, the meat becomes tender.

The most important point to remember about cooking meat is that any cut of meat can be made tender, palatable, and flavorful when cooked in the appropriate manner. The two methods of cooking meat are dry heat and moist heat.

Meat Tenderness

In most cases the tenderness of the cut determines the preferred cooking method. The methods now in use are described in this section.

Tender Cuts

Tender cuts of meat, with few exceptions, are best when cooked with dry heat, such as is done in roasting, broiling, panbroiling, and panfrying. Exceptions are veal steaks, veal chops, and thick pork chops, which usually are braised. Pork chops also can be grilled or broiled. When pork chops are broiled, the temperature used must produce chops that are done in the center by the time they are browned on the outside. Veal steaks and chops do not have sufficient fat for broiling. They are braised so that they may be tender and juicy when cooked well done.

Less Tender Cuts

Less tender cuts of meat are made tender when they are cooked with moist heat, the meat being surrounded by either steam or hot liquid. Slow cooking in moisture softens the connective tissue, the part of the meat that may not be made tender quickly. Braising, for example, is the method by which pot roasts and Swiss steaks are cooked. Large cuts such as corned beef and stews are cooked in liquid.

Cooking Losses

Temperature is one of the most important factors in meat cookery. Regardless of the method used, meat shrinks in size and weight during cooking. Water and other volatile substances frequently evaporate from the surface of meat as it cooks. Some fat, water, extractives, vitamins, and other substances also are released during cooking but are retained in the pan drippings or cooking liquid. These losses are spoken of as shrinkage or cooking loss. Cooking losses are important because they affect the appearance, the palatability, and the amount of meat to be served.

The principal factors that help control cooking losses are as follows:

1. The temperature at which the meat is cooked. The higher the cooking temperature, the greater the shrinkage. Meat is more tender, juicy, and flavorful and more uniformly cooked when it is cooked slowly. Low cooking temperatures also make carving easier and more economical. There is no hard crust to carve through and the more tender meat holds together better.

2. The internal temperature of the meat or its degree of doneness. Shrinkage increases in proportion to the rise in temperature. The degree of doneness or the internal temperature to which meat is cooked may influence its shrinkage as much as or even more than the cooking temperature. As the degree of doneness is increased, shrinkage is increased. Pork must be cooked well done, but pork roasts become dry and shrink unduly when overcooked. When cooked to the correct degree of doneness, however, they are juicy and flavorful. In addition, there is more meat to serve.

Cooking Time Requirements

The meat thermometer is the most accurate guide to the degree of doneness of meat, especially roasts. Cooking time often is used as a guide to the degree of doneness, but at best the time is only an estimate. Cooking time usually is a guide for broiled meats, pot roasts, other braised cuts and stews, and meats cooked in liquid. Tenderness of the meat is most commonly checked by the insertion of a fork into the meat.

The four factors that must be considered in the determination of the cooking time required are as follows:

1. The cooking temperature. Even a slight variation in temperature affects the time required to cook the meat to a certain degree of doneness.
2. The size and shape of the cut. In general, the larger the cut, the fewer the minutes per pound required to cook it. However, a chunky cut requires longer cooking time than a flat, thin one of the same weight.
3. The amount of aging. Cuts from aged beef require slightly less time to reach the desired degree of doneness than those which have not been aged.
4. The degree of doneness desired. Some people prefer meat cooked rare or rare to medium; others want meat cooked well done. The meat thermometer eliminates guesswork since it indicates any degree of doneness desired.

Methods of Cooking Meat

Basic methods of meat cookery are roasting, broiling, panbroiling (or griddle-broiling), frying, sautéing, and cooking in liquid. Frying includes panfrying and deep-fat frying. The method selected for any individual cut depends on the tenderness of the meat, its size and thickness, and the cooking facilities available.

Roasting

Meat should be salted on the fat side only, because salt tends to draw out the moisture of exposed lean surfaces of meat. The meat should be placed fat side up and should not be covered or basted, nor should water be added. The best temperature for roasting beef or lamb is 300° to 325° F. (150° to 165° C).

Meat that is boned and rolled requires longer cooking time than meat with the bone in. The back of the oven is hotter than the front, because some of the heat escapes through the oven door. The position of the meat should be changed several times during the roasting period to ensure uniform cooking.

Broiling

Broiling is suitable for tender beef steaks, lamb chops, pork chops, sliced ham, bacon, and ground beef or lamb.

The steps to be taken in broiling are the following:

1. Set oven regulator for broiling.
2. Place meat on rack of broiler pan 2 to 5 inches (5 to 15 centimetres) from heat.
3. Broil until top side is brown.
4. Season top side with salt and pepper if desired.
5. Turn and brown other side.
6. Season if desired, and serve at once.

Panbroiling

The same tender cuts suitable for broiling when cut 1 inch (2.5 centimetres) or less thick may also be panbroiled or griddle broiled. Panbroiling is also a convenient method for cooking a small steak or a few chops.

The steps to be taken in panbroiling are as follows:

1. Place meat in heavy frying pan or on griddle.
2. Do not add fat or water.
3. Cook slowly.
4. Pour off or remove fat as it accumulates.
5. Brown meat on both sides.
6. Do not overcook. Season if desired, and serve at once.

Panfrying

When a small amount of fat is added before cooking or is allowed to accumulate during cooking, the method is called panfrying. Comparatively thin pieces of tender meat, such as those made tender by pounding, scoring, cubing, or grinding, may be fried.

The steps to be taken in panfrying are as follows:

1. Brown the meat on both sides in a small amount of fat.

2. Season with salt and pepper if desired.
3. Do not cover meat.
4. Cook at moderate temperature and turn occasionally until done.

Deep-Fat Frying

The cooking of meat immersed in fat is called deep-fat frying. This method of cooking is sometimes used for such items as brains, sweetbreads, liver, croquettes, and leftover meat. The meat usually is coated with egg and crumbs or a batter, or it is dredged with flour or corn meal.

The steps to be taken in deep-fat frying are as follows:

1. Use deep kettle and wire frying basket.
2. Heat fat to frying temperature. Suitable temperatures for deep-fat frying meat range from 300° to 360° F. (150° to 180° C).
3. Place meat in frying basket.
4. Brown meat, and cook it through.
5. When done, drain fat from meat into kettle and remove meat from basket.
6. Strain fat through cloth. Cool. Cover and store in refrigerator until ready to use again.

Braising

Braising is suitable for less tender cuts of meat. Some tender cuts also are best if braised. These include pork steaks and cutlets; veal chops, steaks, and cutlets; and pork liver.

The steps to be taken in braising are as follows:

1. Brown meat slowly on all sides in a heavy utensil. Pour off drippings after browning.
2. Season with salt, pepper, herbs, and spices if desired.
3. Add a small amount of liquid if necessary.
4. Cover tightly.
5. Cook at low temperature until tender.
6. Make sauce or gravy from the liquid in the pan if desired.

Sautéing

Sautéing refers to cooking food lightly and quickly in a small amount of fat. Only tender cuts of meat are used in this type of cooking. The cuts used for sautéing are scallopini of veal, tenderloin tips, veal cutlet, and pork tenderloin.

Cooking in Liquid

Large, less tender cuts and stew meats are prepared by cooking in liquid. This method normally is used in the preparation of meat soups. Some of the tender cuts of meat also may be cooked in liquid.

The steps to be taken in cooking large, less tender cuts are as follows:

1. Brown meat on all sides if desired.
2. Cover the meat with water or stock.
3. Season with salt, pepper, herbs, spices, and vegetables if desired.
4. Cover kettle and simmer until tender. (Do not boil.)
5. If the meat is to be served cold, let it cool and then chill in the stock in which it was cooked.
6. When vegetables are to be cooked with the meat, as in boiled dinners, add the vegetables whole or in pieces, allowing enough time for each vegetable to be cooked.

The steps to be taken in cooking stews are as follows:

1. Cut meat into uniform pieces, usually 1- or 2-inch (3- or 5-centimetre) cubes.
2. Brown cubes of meat on all sides if brown stew is desired.
3. Add just enough water, vegetable juices, or other liquid to cover meat.
4. Season with salt, pepper, herbs, and spices if desired
5. Cover kettle and simmer until meat is tender. (Do not boil.)
6. Add vegetables, allowing enough time for each vegetable to be cooked.
7. Remove meat and vegetables to a pan, platter, or casserole when done and keep hot.
8. Thicken cooking liquid with flour for gravy if desired.
9. Serve hot gravy (or thickened liquid) over meat and vegetables or serve separately in sauce boat.

Meat pies may be made from the stew. A meat pie is merely a stew with a top on it. The top may be made of pastry, biscuits, biscuit dough, mashed potatoes, or cereal.

Microwave Cooking

Microwave cooking is the newest innovation in cooking. In electronic or microwave cooking, food is cooked by the heat generated in the food itself. Since no other heat is produced, the air, range, and utensils remain cool except for a possible transfer of heat from the food. The primary advantage of microwave cooking lies in the time saved.

Although there are more and more consumer electronic ovens in use, their greatest acceptance at the present time has been by the institutional food trade. Microwave energy is especially adaptable in the reconstitution of frozen cooked or uncooked foods, either in bulk or portion packs. Ovens are now available that will heat as many as 240 portions at a time. Some vending machines are designed to heat either frozen or refrigerated foods to serving temperature, one portion at a time.

Some problems still exist in microwave cooking, especially as to the cooking of basic meat cuts. For example, electronically cooked roasts have greater shrinkage than roasts cooked by normal means. Also, since microwaves frequently do not penetrate a roast uniformly, variations may occur in the doneness of the meat. The amount of food being electronically cooked greatly affects the cooking time.

Foods cooked solely by microwave do not brown. To overcome the lack of browning, some manufacturers of electric ranges have added a conventional heating unit that operates simultaneously with the microwaves. Continuing research programs of industry, government, and institutions of higher education may well provide solutions to the challenges presented by this dramatic cooking method.

Cooking Tests

Thousands of experiments on the cooking of meat have been conducted in the research laboratories of colleges and universities and the U.S. Department of Agriculture. These tests have proved that cooking meat at low temperatures causes less shrinkage and produces a more tender, flavorful, and juicy product. The meat is also easier to carve. When constant low temperatures are used, less fuel is consumed. In addition, less checking of the meat is necessary, and cooking pans are easier to clean.

Cooking Techniques

The meatcutter should be aware of the many techniques that have proved successful in the cooking of meat.

Cooking Pork

Practically all pork on the market comes from hogs that are 6 to 12 months of age. Therefore, pork cuts are fairly uniform in quality. The lean of high-quality fresh pork is grayish-pink in color. Both flesh and fat are firm. The bones are soft and have a slight tinge of red.

Pork is highly perishable and requires careful handling. It should be kept refrigerated at 32° F. (0° C). It cannot be aged. It must be cooked slowly and well done for roasting. Pork loin requires 35 to 40 minutes per pound. Spareribs should be simmered for 30 minutes, then placed in a roasting pan or on a rack and baked for 1½ hours. Barbecue sauce can be put on spareribs if a sheet of aluminum foil is placed over the ribs to keep them from drying out. Ribs should be checked often and kept moist with sauce.

Cooking Ham

Hams used to be cured in salty brine; today they undergo a mild-curing process. They must be kept under refrigeration at all times and should be kept wrapped when taken home and stored in the home refrigerator. This practice prevents the odor of the ham from permeating other food in the refrigerator.

The old-fashioned way of baking ham with brown sugar and pineapple juice is being replaced by new cooking methods. The cook can add brandy with brown sugar or orange marmalade or any other type of preserves, or he or she can baste ham with any kind of fruit juice or ginger ale.

Turning Roasts

In turning roasts, chops, steaks, chicken, and fish, the cook should use tongs. When a fork is stuck into chops, steaks, and so forth to turn them over, juices escape; this can cause the meat to become dry. If a fork must be used, it should be inserted into the fat around the edge of the chops or steak for maximum juice retention.

The internal temperature of large roasts rises after they are removed from the oven, because the roasts continue to cook for some time. This fact should be kept in mind if one desires meat to be rare or medium rare. A roast that has been cooked medium may become well done after it rests. The best oven temperature for roasts is 300° to 325° F. (150° to 165° C).

Cooking Frozen Meats

Frozen meat can be cooked after being thawed, but it is better to cook frozen meat while still in the frozen state. Meat cooked frozen retains its vitamins and protein. Meat cooked after being thawed tends to be less tender as it loses its natural juices. Moreover, cooking thawed meat raises the cost of the meat because of increased shrinkage.

Leftovers can be frozen, but they should be cooked frozen. Frozen leftover meat should be cooked in the same way as a TV dinner—wrapped in aluminum foil and placed in a hot oven.

Cooking in Bags

Roasting or cooking in a bag is not new. Clear cooking bags are now available for this purpose. Whether it be a roast, a turkey, or a chicken, the procedure is the same. The roast will brown in the bag; however, the process does not take quite as much time as regular roasting. Like other ways of cooking, cooking in bags is becoming more and more popular.

Wrapping meat in aluminum foil is another method used by many cooks. The roast should be seasoned and then wrapped in aluminum foil. Basting liquids are not needed when a bag or aluminum foil is used. Vegetables can be added, allowing enough time for each vegetable to be cooked. These methods permit hotter cooking temperatures without the shrinkage of oven roasting.

Study Assignment

Romans and Ziegler, *The Meat We Eat*. Read pp. 657—708.

UNIT H—MEAT SALES PROMOTION

TOPIC 3—COOKING MEAT

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. Generally speaking, meat contains more 1 tissue and 2 than do other types of flesh, such as chicken and many kinds of fish.	1. ________ 2. ________
2. With few exceptions, tender cuts of meat are best when cooked with 3 heat, such as is done in roasting and broiling.	3. ________
3. Veal steaks and chops are braised, because they do not have enough 4 for broiling.	4. ________
4. Less tender cuts of meat are made tender by being cooked with 5 heat, which softens the 6 tissue.	5. ________ 6. ________
5. The temperature at which meat is cooked demands close attention, especially because of 7 or cooking loss caused by the heat.	7. ________
6. Cooking loss is important, because it affects the appearance, 8 , and 9 of meat to be served.	8. ________ 9. ________
7. The degree of doneness or 10 temperature to which meat is cooked may influence 11 as much as or more than the cooking temperature.	10. ________ 11. ________
8. The most accurate guide to the degree of doneness of meat, especially roasts, is a meat 12 .	12. ________
9. The browning of a piece of meat on both sides in a small amount of fat is known as 13 ; the cooking of meat immersed in fat is called 14 -fat frying.	13. ________ 14. ________
10. In turning roasts, chops, steaks, chicken, and fish, the cook should use 15 to prevent the escape of meat juices.	15. ________

UNIT H—MEAT SALES PROMOTION

TOPIC 4—KOSHER MEATS

This topic, "Kosher Meats," is planned to provide answers to the following questions:

- **Why should all meatcutters be familiar with Jewish holidays?**
- **What is the meaning of *kosher?***
- **How soon after slaughter is kosher meat sold?**
- **How great is the demand for kosher meat in America?**

As the apprentice meatcutter works in areas in which different religious and ethnic groups live, he or she will find that many of them have certain restrictions and preferences in their taste for meat. The meatcutter should learn about customer preferences and cater to the particular wishes of the different groups.

Kosher Restrictions

One of the largest of these special groups in the United States is comprised of the people of the Jewish faith. Although not all Jews observe all kosher restrictions, those who do follow them are numerous enough to warrant the apprentice meatcutter learning about these restrictions.

Jewish Holidays

The kosher laws, which are more than 3,000 years old, designate the foods that may be eaten when they are ritually cleaned or prepared. Meatcutters should know the Jewish holidays and the regulations for kosher slaughter. Jewish holidays do not come on the same date each year, and even though the slaughtering of animals is permitted on certain days or certain holidays, no kosher slaughtering ever occurs on Saturdays.

Fast days. Only two of the Jewish holidays are regarded as fast days, the ninth day of Tishah b'Ab and Yom Kippur. On these two fast days, Orthodox Jews do not eat any food or drink any liquid. Yom Kippur, in particular, is regarded as a very strict fast day. The effect on the demand for livestock on these days is not entirely that of stopping slaughtering operations. During Tishah b'Ab, slaughtering is permitted. The chief influence of Tishah b'Ab and Yom Kippur on the demand for livestock is that on these days Orthodox Jews do not consume meat.

Feast days. The uninformed generally believe that only certain foods are eaten on certain Jewish holidays; however, this is not the case. On any holiday that is regarded as a feast day, any kind of kosher meat or other food may be consumed. Although meat consumption is permitted on most of the Jewish holidays, fowl and fish are the foods commonly consumed on these days. Poultry is a big competitor with beef for the dollars spent by Jewish consumers.

In all, 40 days each year are set aside as Jewish holidays. No work is permitted on 13 of these days. Thus, for about 2 weeks of each year no livestock is slaughtered for the kosher trade.

Kosher Requirements

Orthodox Jews do not eat any pork. However, they do eat beef, veal, and lamb. Kosher (Hebrew for "fit and proper") meats, or the meats that are required by Orthodox Jews, come from packing plants where animals are slaughtered and meat prepared under the close supervision of a rabbi or the representative of a rabbinical board.

The preparation of these meats is a religious rite. "Sticking" the animal is not permitted as for the gentile trade; instead, the throat of the animal is cut. After this operation a careful physical examination is made of all parts of the carcass. Particular attention is paid to the lungs and stomach. If the lungs will not hold air, if any lesions are found any place in the body, or if the animal's stomach is pierced by mechanical means or by disease, the meat of that animal does not meet the requirements of the kosher trade. It is, therefore, known as *terafah,* which means "forbidden food." If passed by the federal inspector as suitable for food, the *terafah* meat then may be used by the gentile trade.

Kosher Cuts

The Jewish trade uses only those cuts that come from the forequarter of the carcass. The reason for this practice is that the meat must have the veins removed before it can be eaten by Orthodox Jews, and forequarters are easier to devein than hindquarters. No rule prevents the meat from a hindquarter being consumed by Orthodox Jews, but deveining a hindquarter requires cutting it up into small pieces that are very unattractive and unsuitable for anything but ground meat or stews. Hence, the practice is to use only the forequarters.

Beef carcasses for the kosher trade in New York City, Chicago, and Philadelphia are separated; one rib is left on the hindquarters and 12 are left on the forequarters. This method of cutting places approximately 52 percent of the weight of the carcass in the two forequarters. Kosher lamb and veal carcasses also are cut with one rib on the hindquarters. Approximately 50 percent of the lamb carcass and 50 percent of the veal are in the kosher forequarters.

Cuts for the kosher trade usually are sold very soon after slaughter because fresh kosher meat normally is consumed within 72 hours after slaughter. Retail buyers of kosher meats frequently trade and buy on the killing floor or as the carcasses first enter the coolers because at that time less work is required to prepare them in conformity with the requirements of the Jewish religion. Also, deveining the meat is easier while it is still warm than after it has become chilled. The 72-hour limit for consuming meat can be extended three times by a religious rite. The rite is performed by the rabbi or a representative. Kosher butchers and housewives also may perform this rite. Kosher sausage and prepared meats, which take much longer than three periods of 72 hours each to make, are handled so as to make them kosher indefinitely. These meats are deveined, soaked in water ½ hour, and sprinkled with salt. After 1 hour the meat is washed thoroughly. The entire operation must be performed under the supervision of representatives of the faith.

Saturday is regarded as a holy day by the Jews in much the same way as Sunday is regarded holy by gentiles. Saturdays, like any other Jewish holiday, are observed from Friday sundown until Saturday sundown, after which business operations may be carried on.

Number of Orthodox Jews

No one knows how many Jews in the United States are Orthodox. In New York City, which has a population of about 3,500,000 Jews, about 50 percent are Orthodox. If an accurate survey of the United States could be made, it would show that several million Jews consume nothing but kosher meat. Consideration of this number leads one to realize the importance and necessity of becoming familiar with the various Jewish holidays.

Holiday Meals

In the Jewish faith, all meat must be kosher and the Friday night meal should be chicken.

The Catholics have three holidays during which they abstain from eating meat, which most often is replaced by fish. These are Ash Wednesday, Good Friday, and every Friday during Lent.

Holiday Food Calendar

Certain holidays during the year have demands for certain cuts of meat:

January 1 (New Year's Day)—mostly hams and some turkeys
Feb. 14 (Valentine's Day)—eat out
Mar. 17 (St. Patrick's Day)—corn beef and cabbage
Easter Sunday—ham, turkey, or leg of lamb
May 30 (Memorial Day)—no special trend
July 4 (Independence Day)—picnic items
First Monday in September (Labor Day)—ham
Nov. 11 (Veteran's Day)—no trend
Last Thursday in November (Thanksgiving Day)—turkey and some ham
Dec. 25 (Christmas)—ham and turkey

UNIT H—MEAT SALES PROMOTION

TOPIC 4—KOSHER MEATS

Study Guide

Determine the correct word for each numbered blank in a sentence, and write that word in the corresponding blank at the right.

1. The kosher laws designate food that may be eaten when ritually 1 or 2 .

1. ________
2. ________

2. A basic kosher rule is that the slaughter of animals is never permitted on 3 .

3. ________

3. The ninth day of Tishah b'Ab and Yom Kippur are 4 days on which 5 Jews do not eat meat.

4. ________
5. ________

4. On any Jewish holiday regarded as a 6 day, any kind of kosher meat or other food may be eaten.

6. ________

5. The most common foods eaten on these days are 7 and 8 .

7. ________
8. ________

6. A uniform rule for Orthodox Jews is that 9 is never to be eaten.

9. ________

7. The preparation of kosher meats under the supervision of a rabbi or the representative of a rabbinical 10 is a religious 11 .

10. ________
11. ________

8. Only the forequarter of a carcass is used in the kosher trade, because the forequarter is easier to 12 than the hindquarter.

12. ________

9. A religious rite may be performed for the purpose of extending the 13 -hour Orthodox limit for consuming meat after slaughter.

13. ________

10. Orthodox Jews observe Saturday, their holy day, from Friday 14 to Saturday 15 .

14. ________
15. ________

Glossary

The definitions of terms in this glossary are those that are pertinent to the meatcutting trade and are not necessarily those found in standard dictionaries. Some of the terms included are colloquial in nature and are used with the meanings given for the meatcutting trade only.

Abattoir—A slaughterhouse.

Aging (also known as ripening)—A process increasing flavor and tenderness of meat by the action of certain enzymes on connective tissue, the less tender part of the meat. The tissue is reduced to a gelatinous consistency. Usual temperature is around 36° F. (2° C) for 2 to 6 weeks. Beef, lamb, and mutton are the only meats aged, and only the better grades are kept for the longer periods because their fat covering protects the lean from microorganisms.

Aitchbone (also known as rump bone)—The bone that together with the hip bone forms the pelvic bone. In beef and veal it is contained in the rump roast; in lamb it is part of the leg; and in pork it is in the ham. In beef it helps determine the sex and age of the animal from which the meat comes.

Antemortem inspection—The visual inspection of animals before slaughter for evidence of disease. This observation, required by both federal and state laws, is made on the day animals are to be slaughtered. Those suspected of disease are segregated and slaughtered separately.

Aquaculture—Domestic fish farming or water farming.

Arm chuck—A forequarter with rib, plate, and brisket removed.

Atlas joint—The joint or vertebra that is found in the neck of the animal and that holds the head in place.

Barrow—A male hog castrated before reaching sexual maturity; one of the sex classes of pork.

Beef—Meat from mature animals of the bovine species (cattle).

Beef spareribs—Ribs off a prime rib with the meat left on.

Block-ready (subprimal)—Meat broken down before it is shipped to market, such as short loins, head loins, and rounds (shank removed). Other examples are 7-inch (18-centimetre) ribs (chine removed), chuck back, O-bone, clod or crossrib, shank, brisket (boneless), flank steak, and short ribs. Excess fat and bone are removed.

Boar—A male hog allowed to retain sexual characteristics; a class of pork based on sex.

Bone dust—The white film that collects on meat from power saw cutting.

Bottom sirloin—The tail off the top sirloin.

Bovine—Relating to or resembling the ox or cow.

Break joint (lamb)—A carcass that has break joints on both its foreshanks and four well-defined ridges that are smooth, moist, and red. In yearlings ridges are hard and white. On mutton, the feet will not break at this joint but are taken off below it at the round joint.

Breakfast steak—Thin boneless top round, eye of round, or sirloin tip suitable for panfrying (small).

Brisket—The cut of meat that includes the breast muscles and other tissues with bones removed. It may refer generally to an animal's breast, specifically to the lower part of the chest.

Broiler chicken (also known as fryer)—A class of chickens consisting of young birds of either sex that are usually 8 to 10 weeks of age. Nearly three-fourths of all chickens hatched are marketed as broilers.

Buck mutton—Meat taken from uncastrated male sheep more than 2 years old at the time of slaughter.

Bull—An adult male bovine that has not been castrated. It is one of the five classes into which beef carcasses are divided and one of the market classes for slaughter calves.

Butterfly fillets (fish)—Two single fillets held together by the uncut flesh and skin of the belly.

Button—White cartilage on the tips of chine bones in the forequarters of a young animal. As the animal matures, the tips harden into bone. The presence or absence of buttons is an indication of the stage of maturity of the animal.

Calf—A young bovine 3 to 12 months of age (the stage between veal and beef). However, meat packers, retailers, and customers usually classify all meat from beef animals of less than one year as "veal."

Candy—Lean pieces of meat for cube steak, stew meat, or other uses at a higher price.

Cap meat rib—This separates the rib eye muscle from the outside fat. It also is known as the lifter on the large end of prime rib. It may be trimmed and sold as boneless short ribs.

Capon—A castrated (unsexed) male chicken (usually less than 8 months of age) that is tender-meated and has a soft, pliable, smooth-textured skin.

Caponette—A chemically castrated fowl.

Carcass—The dressed body, including viscera, of slaughtered cattle, sheep, swine, fowl, or goat that has been commercially prepared for human use.

Caul fat (also known as web fat)—Fat surrounding the stomach and intestines of an animal. It is often wrapped around the legs of lamb and rounds of veal at the time of dressing.

Chateaubriand—Fillet or the small end of the top sirloin.

Chine bone—A piece of the backbone of an animal carcass, particularly including the thoracic vertebrae (between the neck and abdomen), upon which are found "buttons."

Chopped meat—A carry-over from the time before the advent of the meat grinder when meat was cut into small pieces and chopped on the block by means of a cleaver held in each hand.

Cleaver—A wide, heavy-bladed tool used for cutting animal bodies into joints or pieces.

Closed side or tight side—A side of beef with the kidney tight to the loin or right side.

Cock (also known as an "old rooster")—A mature male chicken of any weight with coarse skin, toughened and darkened meat, and hardened breastbone.

Cod fat—The fat that accumulates in the region of the scrotum of a castrated bovine animal.

Cold storage—An area for storing meat in which the temperature is kept slightly above the freezing point, usually around 36° F. (2° C), and at a humidity of 80 to 85 percent.

Conformation—The general body proportions of an animal and ratio of meat to bone; one of the factors in determining the grade of slaughter cattle.

Cow—A female bovine that has developed, through reproduction or with age, relatively prominent hips and a large middle; one of the five classes of slaughter cattle.

Cross rib roast—Clod with the rib on or boneless cross rib is a clod roast.

Crosscut chuck—Forequarter with the rib and plate removed.

Crown roast (pork, veal, or lamb)—Rack turned into a circle with ribs turned out and end of ribs bare (about 14 ribs are needed to make a crown roast).

Cryogenics—Term used in the meat industry to refer to freezing temperatures from -100° to -459° F. (-73° to -273° C). Two types are liquid nitrogen freezing and carbon dioxide (dry ice) freezing.

Dashpot (also known as a hydraulic shock absorber or quick-stop device)—Device that regulates the movement of the chart in a cylinder scale and absorbs the shock caused by meat being tossed on the platter of the scale.

Deep well—Refrigerated conveyor, usually 3 to 4 feet (0.9 to 1.2 metres) wide and 12 inches (31 centimetres) deep.

Drawn fish—Fish marketed with the entrails removed.

Dressed fish—Scaled and eviscerated (entrails removed) fish, usually with the head, tail, and fins removed.

Drift or shrink—The 3 to 4 percent loss in weight caused when cattle are kept off feed for 24 hours. Buyers usually request that this practice be followed or that allowance be made for it.

Duckling—A young duck (of either sex) that usually weighs from 4 to 6 pounds (2 to 3 kilograms). Generally, it has an easily collapsible windpipe.

Electric defrost—Method for defrosting refrigerated display cases and frozen food cases. A time clock turns off the compressor and turns on an electric heat coil that warms the air flowing over the coils and thus defrosts the system.

Eviscerate—To remove the entrails of an animal.

Ewe—A mature female sheep that has given birth to lambs; corresponds to a cow in beef animals.

Ewe lamb—A young female sheep that has not given birth to lambs and was at least 20 months old at time of slaughter.

Family steak—A cross-rib or clod steak.

Farmer's style pork—A common style for dressing pork; accomplished by the splitting of the carcass on both sides of the backbone. Two sides and a backbone are produced.

Fat or butcher-type pork—One of the use classes of pork; the male or female of fat breeds from hogs that are blocky in conformation (general body proportions).

Feathering (beef)—The intermingling of fat with the lean found between the ribs, especially in the intercostal muscles.

Feeder cattle—Cattle that have the size and quality but not the weight required for profitable slaughter. Large numbers are shipped to California, where they are placed in feeder lots to be fed before slaughter.

Fell (lamb)—The thin, tough skin covering the carcass; located directly beneath the hide.

Fillets (fish)—Sides of fish cut away from the backbone; practically boneless and with little or no waste.

Finish—The quality, amount, color, and distribution of fat on an animal; one factor in determining the grade of slaughter animals.

Fish steaks—Cross-sectional slices of the larger sizes of dressed fish, usually about ¾ inch (2 centimetres) thick.

Fish sticks—Pieces of fish cut lengthwise or crosswise from fillets into portions of uniform width and length, usually about 1 inch (2.5 centimetres) wide and 3 inches (8 centimetres) long.

Forequarter—The front half of a side of beef, veal, mutton, or lamb; usually divided between the twelfth and thirteenth ribs. In beef it includes about two-thirds of all the less expensive cuts of meat; chuck, brisket and foreshank, rib, and short plate.

Fowl—The different marketable species of poultry, such as chickens, turkeys, ducks, geese, guinea fowl, and pigeons.

Freezer burn—The loss of moisture from the frozen surface of meat.

French lamb chop—Rib chop with the rib bone bared from 1 inch (2.5 centimetres) above the eye of the rib to the end of the bone.

Fresh meat—Meat that has undergone no substantial change in character since the time of slaughter. Its freshness depends directly on its condition when purchased and the temperature of storage.

Frozen meat—Meat preserved at 0° F. (-18° C) or lower. Meat that is to be slowly frozen is exposed to -5° to -15° F. (-20° to -26° C); if it is to be quickly frozen, it is exposed to -25° to -50° F. (-32° to -45° C).

Fryer (chicken)—A young chicken (of either sex), usually 8 to 10 weeks old, that is tender-meated and has soft, pliable, smooth-textured skin and flexible breastbone cartilage. It usually weighs between 2.5 and 3.5 pounds (1 and 1.5 kilograms).

Gambrel—A crooked stick of stainless steel or galvanized iron that has been designed for suspending carcasses of animals, usually during the slaughtering process.

Genuine spring lambs—Young lambs 3 to 5 months old that are available from March to November. The meat of these animals is light, pink, and tender. Genuine spring lamb is one of the age classes of lambs.

Gilt—A young female swine that has not given birth; this is one of the sex classes of pork.

Gracilis muscle—A muscle found on the inside of the thigh of an animal.

Gravity defrost—One of the methods used for defrosting refrigerated display cases. Under this system the compressor, which normally cools the air, is automatically stopped, and the fan continues to send air through the cooling mechanism, thus defrosting the coils. This method is too slow to be used on frozen food cases.

"Gravy" cut—The term applied to cuts of low grade or inexpensive meats.

Hanging tender—The support muscle that holds the organs in place such as the liver, stomach, etc.

Head loin—Sirloin before it is cut into steak or boned into top sirloin and fillet.

Heifer—An immature female bovine that has not developed the physical characteristics typical of cows.

Hindquarter—The back half of a side of beef, veal, mutton, or lamb, including a leg and, usually, one or more ribs. In beef it includes three general sections: loin or "steak house," round, and flank.

Hog-corn price ratio—The number of bushels of corn that can be purchased for the price of 100 pounds (45 kilograms) of pork, a relationship that varies. When feeding corn to hogs is more profitable than selling it on the market, more farmers go into hog production.

Hothouse lambs—Lambs born from September to February and housed in barns or sheds where they have been protected from the cold weather. They are marketed from 6 to 10 weeks of age at live weights ranging from 25 to 60 pounds (10 to 25 kilograms). They are not commonly found in California.

Indenture—A contract between the state, the apprentice, and the employer.

Indication—The steps taken by the operator of a cash register in recording a sale, such as the punching of the keys for the date, department number, and amount of sale.

Interlock—An electrical contact button built into a machine to ensure the safety of the operation. In most cases the button is located so that it is automatically depressed when the cover or other safety guard is in position. The machine will operate only when this interlock button is depressed.

Involuntary, nonstriated, smooth muscles—One of the two major types of muscles found in the body of an animal; generally used in reference to the organs of the intestinal tract (visceral muscles).

Kabobs—Sirloin and top round steak cut into squares, marinated, and cooked on skewers.

Lamb—A young sheep, usually 8 to 12 months old, the meat of which has not as yet become mutton. Lamb is identified by the well-defined break joints on its forelegs.

Lard—Rendered fresh fat from hogs, the most important sources being leaf fat, fat trimmings, and fat backs and plates.

Leaf lard—Lard rendered from the internal fat that lines the abdominal cavity and encloses the kidney of the hog. It does not include the fat attached to the intestines.

Lean, meat, or bacon-type pork—One of the use classes of pork. Male or female meat breeds from long, lean hogs raised mostly in Canada and England.

London broil—Thick cut top round or tenderized flank steak, rolled, skewered, and cut into steaks.

Marbling—The intermingling of fat among muscle fibers.

Meat—The properly dressed flesh derived from cattle, swine, sheep, or goats that are sufficiently mature and in good health at the time of dressing. In its broadest use the term refers to the flesh of any animal used for food.

Meat by-products—Everything of value produced on the killing floor other than the dressed carcass of the animal. By-products are classified as edible or inedible.

Mutton—Meat of sheep 20 months of age or older.

New York steak—Strip steak.

Open heifer—A female bovine that has not been bred.

Open side or loose side—Left side of beef where kidney is loose in loin and hanging tender is attached.

Ovine—Of, being, or relating to sheep.

Packer's style (pork)—A style for dressing pork that produces two separate sides of the carcass with the head and leaf fat removed.

Parallax—The difference in the reading of a cylinder scale as viewed by persons of different heights.

Pig—A young swine that has not reached sexual maturity.

Pizzle eye (beef)—The remains of the crural attachments of the penis located at the point end of the aitchbone.

Pluck—Organs that lie in the thoracic cavity (the area above the diaphragm bounded by the wall of the chest), specifically the heart, lungs, gullet, and windpipe.

Poll—The region on the top of the head and between the ears of most animals.

Polled—Hornless; for example, a polled Hereford beef.

Porcine—Relating to, being, or suggesting swine.

Pork—Meat derived from swine of either sex. Pork has six sex classes (shoat, barrow, gilt, stag, boar, and sow) and five use classes (fat, lean, sow, shippers, and roasting pigs).

Portion control—The term used to express the process developed by jobbers to meet the demand of restaurants, hotels, and institutions to supply all meat of a certain cut at a specified weight and size.

Postmortem inspection—An examination of the carcass and the viscera (internal organs) of an animal just after slaughtering.

Primal cuts (beef)—Pieces of meat identified as square-cut chucks, ribs, short loins, loin ends, or rounds.

Prime rib—A standing rib roast having seven ribs. The ribs may be 7 or 11 inches (18 or 28 centimetres) long.

Quality—One of the factors used for grading a slaughter animal. The term refers to the refinement of hair, hide, and bone and to the smoothness and symmetry of the body. Quality is indicated by such things as the color and texture of the lean, the firmness of the lean and fat, and the degree of marbling of the meat.

Reverse-cycle or hot-gas defrost—System used for defrosting refrigerated display cases and frozen food cases. The heated air from the compressing process is sent through the system to defrost it.

Roaster (chicken)—Chicken (of either sex) 3 to 5 months old and more than 3 pounds (1.4 kilograms) in weight. The breastbone cartilage is somewhat less flexible than that of a broiler or fryer.

Roasting pigs or sucklings (pork)—One of the use classes of pork. These carcasses are from fat, smooth young pigs with light-colored flesh and soft red bones. They usually weigh from 10 to 30 pounds (5 to 15 kilograms).

Salisbury steak—Shaped ground beef patties.

Scurf—Flakelike or scalelike material that is found on the skin of some animals.

Shipper's style (pork)—The method of dressing pork that produces an unsplit carcass with the head on and leaf fat left in.

Shoat—A young swine of either sex, usually less than a year old and weighing 60 to 100 pounds (25 to 45 kilograms).

Short loin—Primal cut before the club, T-bone, and Porterhouse steaks are cut from it.

Shrink tunnel—A cover or packaging line where heat applied to a package containing meat causes the paper to shrink tight around the meat.

Shrouding—Cloth for wrapping hot beef carcasses to smooth and even the fat.

Side—One matched forequarter and hindquarter from a carcass of beef, veal, lamb, or mutton.

Skewer—A metal or wood pin to hold meat together.

Skirt—The diaphragm muscle of a slaughtered animal. It is edible once the membrane joining the muscle has been removed.

Slaughter cattle—All the market classes and grades of cattle bought for immediate slaughter.

Smooth muscle (or involuntary muscle)—All glandular meats are smooth muscle except the heart.

Sow—One of the classes of pork carcasses applied to an adult female swine that has given birth to (farrowed) one or more litters of pigs. Sows usually weigh from 200 to 300 pounds (90 to 135 kilograms).

Spayed heifer—Heifer with ovaries removed.

Spencer steak—Rib eye steak (boneless).

Spring lambs—Young lambs 5 to 8 months old, light in weight, fed on grain and milk. They appear on the market from July through December. The thin outside muscle covering the flank and rib is pale pink, and the break joint is red, porous, and well defined. Spring lamb is one of the age classes of lamb.

Squab—A young pigeon of either sex that is very tender-meated.

Stag (beef)—A male bovine castrated after it has developed or has begun to develop the secondary physical characteristics of a bull.

Stag (chicken)—A male chicken, approximately 8 to 10 months of age but of no certain weight. It has coarse skin, a somewhat darkened and toughened flesh, and considerable hardening of the breastbone cartilage.

Stag (hog)—A mature male swine that has been castrated after reaching sexual maturity. It is seldom sold as cuts of pork.

Steak tartare—Coarsely ground, very lean, tender beef. Eaten raw after seasoning.

Steel—A rod fitted with a handle and used for sharpening knives. They usually are 12 or 14 inches (30 or 36 centimetres) in length.

Steer—A male bovine castrated before reaching sexual maturity.

Striated or voluntary muscles (also known as skeletal muscles)—The major composition of a carcass' edible meat, directly or indirectly connected to the skeleton and traversed with light and dark bands of meat. The heart is a striated muscle.

Stringer or needle—A slender, rodlike instrument used in rolling and tying beef or any boneless meat.

Strip steak—New York steak or outside muscle of Porterhouse and T-bone steak (boneless).

Sweetbread—One of the variety meats made of the thymus glands of beef, calf, or lamb. It consists of two kinds, the heart and the throat sweetbreads. It is one of the most perishable of all meats. The pancreas is also known as a sweetbread but should not be confused with this type.

Swine—The term applied to all domesticated animals commonly known as pigs and hogs.

Tare—Undesirable elements (e.g., manure or dirt) or growths that endanger the condition of meat and its by-products; also, an allowance made for packaging when meat is weighed.

Tenderloin (beef)—A standard cut of boneless beef taken from just under the backbone of a full loin. It is a long oval strip of lean beef, thin on one end and much heavier on the other.

Tripe—A cattle's first and second stomachs that have been washed, soaked in lime water, scraped to remove the inside wall, and then cooked (also sometimes pickled in vinegar).

Udder—The milk gland or mammary gland of a female animal.

Veal—Meat derived from bovines that are less than 3 months old and of either sex.

Vealer—A young bovine that is less than 3 months old.

Vertical integration—Any of a number of combinations of the production, processing, and distribution of animals contracted for by a single agency.

Viscera (the plural form of viscus)—Organs found in the trunk proper (abdominal and thoracic cavity), such as the heart, liver, and intestine.

Wether—A male sheep castrated before sexual maturity has been attained.

Whole or round fish—Fish marketed just as they come from the water.

Wiltshire side (pork)—The entire side or half of a hog carcass without the aitchbone, backbone, feet, head, skirt, and tenderloin. It is an English-style side of pork.

Yearling (sheep)—A ewe or wether between 15 and 20 months of age. It has two main weight groups: those of less than 100 pounds (45 kilograms) and those of more than 100 pounds (45 kilograms).

Instructional Materials

Materials Recommended for Each Apprentice

Hobbs, Glen M., and James McKinney. *Practical Mathematics* (Third edition). Chicago: American Technical Society, 1973. (Orders to American Technical Society, 5608 Stony Island Ave., Chicago, IL 60637.)

Meatcutting, Part 1 (Workbook and Testbook). Sacramento: California State Department of Education, 1980. (Orders to California State Department of Education, P.O. Box 271, Sacramento, CA 95802. Write for price list and ordering information.)

Romans, John R., and P. Thomas Ziegler. *The Meat We Eat* (Eleventh edition). Danville, Ill.: The Interstate Printers & Publishers, Inc., 1977. (Orders to the Interstate Printers & Publishers, Inc., 19-27 N. Jackson St., Danville, IL 61832.)

Materials Recommended for the Classroom Library

Meatcutting, Part 2 (Workbook and Testbook). Sacramento: California State Department of Education, 1975.

The Metric Book. New York: Dell Publishing Co., Inc., 1978.

Metrics Made Easy. Woodbury, N.Y.: Barron's Educational Series, Inc., 1976.

Official United States Standards for Grades of Carcass Beef. Washington, D.C.: U.S. Department of Agriculture, Food Safety and Quality Service, 1975.

Official United States Standards for Grades of Lamb, Yearling Mutton, and Mutton Carcasses. Washington, D.C.: U.S. Department of Agriculture, Food Safety and Quality Service, 1969.

Official United States Standards for Grades of Veal and Calf Carcasses. Washington, D.C.: U.S. Department of Agriculture, Agricultural Marketing Service, 1972.

Poultry Grading and Inspection. Washington, D.C.: U.S. Department of Agriculture, Poultry Grading Manual Handbook No. 3, Food Safety and Quality Service, 1977.

Sherman Food, Drug, and Cosmetic Law of 1970. Sacramento: California State Department of Health Services, 1978.

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